Corruption, Taxation, and Loan Conditionality: a Contribution to the Macroeconomics of Reform and Transition with Reference to Russia

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Declaration

I declare that this thesis is my own work, and its content has never been published as part of another research project.

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Summary

The primary objective of this thesis is to contribute to the debate on the reasons behind Russia's poor economic performance in its first decade after the fall of communism, by examining the role of IMF economic programs in the reform process. In particular, we are interested in the failure of neo-classical models of the market economy, upon which economic reform programs were based, to predict the outcomes in Russia. The purpose of the work is to offer a number of theoretical models which incorporate certain characteristics, such as political and economic motivations of both the IMF and Russian government, large-scale public sector corruption, a substantial underground economy, and a weak tax base, and which are capable predicting the resulting failings in the IMF-Russia economic reform program.

In chapter 2, we present a theory of conditionality in which the recipient, aware that the lender faces political and economic motivations in the conditional development lending process, undertakes a game with the lender in which the recipient attempts to undertake the least amount of compliance that guarantees it future loans. There is an exogenous conflict between economics and politics within the lending agency that determines its degree of tolerance for policy (non-) compliance. We then analyse how the donor, in an attempt to regulate its internal conflict, may adopt "rules of thumb" in the lending process which pre-define the actions it will take in response to the lender's level of compliance. The recipient's strategy depends on the payoffs it obtains from the actions available to the lender under each "rule of thumb". We examine how the IMF-Russia relationship from 1992-2002 has elements of the games we model.

In chapter 3, we model corruption as a proportional tax on labour income in a three-sector economy with a corrupt bureaucracy, a legitimate private sector, and a shadow economy, and examine how tighter fiscal policies may result in a rise in corruption. The rise in corruption negatively affects legitimate private sector employment and output. We suggest that the Russian economy has a similar three-sector structure and analyse the impact of reduced spending and increased taxation on corruption and employment.

In chapter 4, we modify Alesina and Tabellini's (1987) model of time inconsistency to allow for a weak tax base and then apply it to post-communist Russia. In particular we examine two non-consecutive time periods in which, for different reasons, public debt could not be used to finance the government's budget deficit: 1992-94 and post August 17 1998. We suggest that Russia did in fact move from one sub-optimal position to another, and we raise questions about the optimality of Russia's current monetary policies.

In chapter 5, we examine the optimality of monetary policy in the presence of bureaucratic corruption. We model corruption as a proportional tax on firm revenue and a positive function of the official tax rate. The higher the official tax, the higher the corruption tax levied by public bureaucrats in order to supplement their decreasing official net wage, and the lower is output. We find that under both discretion and commitment, inflation is higher, and output and taxation are lower, than when there is no corruption.

Chapter 1

Introduction

With the fall of communism in December 1991, the Russian government began a program of reform to aid the transition to a market-based economy. Although the Russian authorities were given extensive political, financial and expert economic advice by western countries and international financial organisations, the reform program seemed beset by problems.

The Russian government has battled long and hard with inflation which has been fuelled by excessive spending, soft budget constraints and credit creation by the central bank. Additionally, restructuring of former state-owned firms has proceeded slowly, the banking sector is in need of reform, the country still lacks a good social security system, and there are structural weaknesses in the regulatory, judicial, and tax systems. While unemployment has not risen by as much as was initially feared, the unemployment rates mask substantial inefficiencies in the capital and labour markets and highlight the unwillingness of employee-owned firms to restructure. Furthermore, wage and payment arrears have grown, corruption has infiltrated all sectors of the Russian economy, and there has been a lack of progress on property rights. Output declined until 1997 when the economy showed positive growth of GDP for the

first time since the reform process started. In 1998 output declined again mainly in response to the August 17 1998 ruble crisis, but has since recovered.

Not all the reforms that Russia has undertaken have been unsuccessful. There was rapid price liberalisation and privatisation of state-owned industries, a value-added tax was successfully introduced early on, and there has been a growth in private sector employment. Structural change also took place with a shift from military to civilian output, an increase in the private retail market, and the development of the financial sector. There were also reforms of the exchange rate system, a successful introduction of the Treasury bill market in 1996, and trade liberalisation.

The primary objective of this thesis is to contribute to the debate of the reasons behind Russia's poor economic performance in its first decade after the fall of communism by examining the role of IMF economic programs in the reform process. In particular, we are interested in the failure of neo-classical models of the market economy, upon which economic reform programs were based, to predict the outcomes in Russia. The purpose of the work is to offer a number of theoretical models which incorporate specific characteristics, such as the conflict between the political and economic motivations of both the lender (the IMF) and the recipient (the Russian government), large-scale public sector corruption, a substantial underground economy, and a weak tax base, and which are capable predicting the resulting failings in the IMF-Russia economic reform program.

Recent economic crises, such as in Russia in August 1998, in Argentina in 2001, and in Brazil in 2002, have highlighted the large gap between the theory and practice of conditional development lending. Multilateral lending between international financial agencies and recipient governments often involves conditionality: recipients have to undertake certain reforms to be eligible for (further) loans. While an extensive

literature evaluates the impact of policy conditionality, less attention has been paid to the *theory* of conditionality. Mosley (1992) models conditionality as a bargaining game between a recipient and a donor in which conditions are imposed by donors and accepted, usually unwillingly, by recipients. Mosley includes an *exogenous* parameter in the utility functions that symbolises the political cost to the recipient and the political benefit to the donor of compliance with the reform agenda.

In fact, existing theories of conditionality such as Mosley's fail to characterise the relationship and predict the outcomes in the Russia-IMF relationship. Indeed, popular opinion in Russia suggests that the IMF bowed to political pressure to help Russia financially, without sound economic basis, relaxing its conditions when necessary, without regard for Russia's ability to pay back the loan under more relaxed conditions. Since Russia joined the IMF, the IMF has lent Russia several billions of dollars conditional on the achievement of certain macroeconomic and structural targets which Russia has consistently failed to achieve.

Despite Russia's inability to achieve the targets set by the IMF, the IMF has continued to lend it money (albeit halting the loans for short periods of time) without fully addressing the reasons why Russia consistently fails to reach the targets. In 1999 the IMF adopted a hard-line stance with Russia with respect to the last $3.4 billion loan under the extended Fund facility programme. There was much debate about what had caused the IMF to change its approach to Russia.

One argument that has been put forward is that the IMF was acting on behalf of the United States, ensuring Russia complied with the United States' political, environmental and economic objectives. Others disagreed with this view. They suggested that the IMF was doing all it could to continue to lend money to Russia

without affecting its reputation. Whatever the reasons behind the IMF's decision, Russia issued a Letter of Intent on July 13 1999 accepting IMF conditions.

In chapter 2 we present a theory of conditionality to help bridge the gap between theory and practice in conditional development lending. We suggest that the donor faces an exogenous conflict between politics and economics within its own decision-making board about the circumstances under which further lending should proceed and that the recipient is, in fact, aware of the politics-economics split within the donor agency, and so there ensues a game in which the recipient attempts to undertake the least amount of compliance that will ensure it further finance and the donor undertakes a (punishment) strategy consistent with its own motivations.

We model the game as a simple two-period game between the lender and the recipient, and solve for the subgame perfect Nash Equilibrium by backwards induction. This yields many possible equilibria, depending on the relative values of the parameters in the payoff functions.

We then suggest that the donor, in an attempt to regulate the conflict within it, may adopt certain rules in an attempt to provide a framework within which lending decisions are made with some consistency. We identify three rules of thumb that the donor might adopt: *no re-lending; reward only full compliance; and leniency.* For each rule, we solve for the subgame perfect Nash equilibrium by backwards induction.

We show that in each case the recipient balances the economic costs associated with losing further finance against the immediate *avoided* political costs of non-compliance. The recipient's actual level of compliance is determined by factors that are specific to each rule.

We then examine whether the relationship between the IMF and Russia from 1992-2002 has elements of the game modelled. We find that at different periods, there are elements of the games that apply under the three rules. In particular, we suggest that the parameters of the game, which affected the internal conflict within the IMF, shifted as Russia evolved into a market economy.

In chapter 3, we model corruption as a proportional tax on labour income in a three-sector economy with a corrupt bureaucracy, a legitimate private sector, and a shadow economy, and examine how tighter fiscal policies, namely reduced expenditure and increased taxation, may result in a rise in corruption. The rise in corruption negatively affects legitimate private sector employment and output.

We define the *corruption effect* as the negative impact of a rise in corruption on legitimate private sector employment and output. We find that in general the corruption effect of increased taxation exceeds that of reduced expenditure. However, if reduced spending results in public sector wage arrears then the corruption effect of reduced spending will exceed that of increased taxation. A crucial assumption is that corrupt bureaucrats will try to maintain a constant net wage.

We suggest that the Russian economy has a similar three-sector structure and analyse whether the fiscal policies pursued by the Russian government resulted in a change in corruption which affected employment and output. Insufficient data makes an in depth empirical study of this chapter impossible. However we examine how the initial indications from the data support the results of our model

Chapter 3 helps explain Russia's poor economic performance during the 1990s, and raises questions about the optimal rate of tax in the presence of an unofficial tax on wages. That is, is the optimal rate of tax in a corrupt economy lower than that in a non-corrupt economy? While our results lend credence to the IMF's recent policies of

"good governance", they suggest corruption should be rooted out *before* structural adjustment programs are undertaken to minimise the corruption effect.

In chapter 4, we analyse the optimality of monetary policy in the presence of a weak tax base. We do so by modifying Alesina and Tabellini's (1987) model of time inconsistency to allow for a weak tax base and then applying it to post-communist Russia. In particular we examine two non-consecutive time periods in which, for different reasons, public debt could not be used to finance the government's budget deficit: 1992-94 and post-August 17th 1998. Alesina and Tabellini's basic model suggests that in both periods when policies were non-coordinated discretion was preferable to commitment.

We suggest, however, that in the first period in Russia, an underlying assumption of the model was violated which meant commitment would have been preferable to discretion. Furthermore, in the second period when commitment to policies was undertaken, we suggest that the assumption was no longer being violated and therefore policies should have been discretionary. Thus Russia has moved from one sub-optimal position to another. In this chapter we also analyse how the causes of a weak tax base affect the choice between rules and discretion. The results of our model, while helping to explain Russia's relatively poor economic performance during key periods in the 1990s, suggests that in 1992-94 output did not fall as much as it would have under a committed central bank, and post August 17 1998, output is actually lower than optimal.

In chapter 5, we examine the optimality of monetary policy in the presence of bureaucratic corruption. We introduce an unofficial corruption tax into a time inconsistency model of monetary policy and examine the consequences for inflation, output, taxation and government expenditure of widespread bureaucratic corruption

under both committed and discretionary monetary policy. We model the corruption tax as a proportional tax on firm revenue and a positive function of the official tax rate. The higher the official tax, the higher the corruption tax levied by public bureaucrats in order to supplement their decreasing official net wage, and the lower is output.

Our model shows that under both discretion and commitment, inflation is higher, and output and taxation are lower than in the case of no corruption. The higher inflation and lower tax rate only manage to mitigate part of the loss in output associated with corruption. As the corruption tax has a negative impact on output and rises as the official tax rate rises, we show that the output loss under commitment exceeds that under discretion because official tax rates are higher.

Furthermore, under both discretion and commitment, the loss in output and the rise in inflation are less when preferences are coordinated than when they are not coordinated. We suggest that when preferences are not coordinated, discretion *will* be preferable to commitment as the gains from reduced inflation are far outweighed by the loss in output and government expenditure, and higher taxes. Both players, the fiscal authority and the central bank, are worse off under commitment. Thus, the movement from discretion to commitment is not a pareto improvement as at least one player is worse off. We go further and suggest that even when preferences are coordinated, discretion *may* be preferable to commitment as the gains from reduced inflation may be outweighed by the loss of output and government expenditure and higher taxes. At least one of the players, particularly the fiscal authority, may be worse off under commitment.

We then look briefly at monetary policy in Russia from 1992-2002, which has been plagued by time inconsistencies. We suggest that one of the least normative

results of our theoretical model, that corruption results in higher inflation and lower taxes, appears to hold in the Russian context.

The implication of chapter 5 is that inflation-reduction in a corrupt economy has more severe consequences for output, inflation and government expenditure than in a non-corrupt economy. This model helps to explain why tighter monetary policies in many transition and developing countries often results in larger-than-expected output losses, higher-than-anticipated inflation, larger government budget deficits, and lower tax rates, and why it may be more difficult for such economies to stick to pre-agreed targets for fiscal and monetary policy.

In chapter 6 we present the conclusions of our work and discuss prospective future research. We also discuss the consensus that neither Russia nor the IMF is to blame for the failure of reforms. After seventy years of central planning and huge market distortions, it was not possible to reform the economy in the short- or medium-term. Russia inherited a large budget deficit, low foreign exchange reserves, a collapse of trade with former Soviet republics, and loss-making public enterprises. Furthermore, Russia had little experience of private ownership and little exposure to the free market system. The IMF has admitted that the legacy of central planning has contributed to the failure of reforms in Russia. M. Camdessus, the former Managing Director of the IMF, suggests that the failure results from "70 years of central planning and the incomplete implementation of reform policies- itself a result of a lack of domestic political consensus on reform" (Camdessus, September 13, 1999). To make matters more difficult, Russia has had to build a democracy from scratch which is a major undertaking at any time and has greatly retarded the reform process.

Chapter 2

A Theory of Conditionality

2.1. Introduction

Multilateral lending between international lending agencies and recipient governments often involves conditionality: recipients have to undertake certain reforms to be eligible for (further) loans. While the conditions, type and amount of loan varies across countries, the multilateral lending process has some common characteristics (some of the points below are raised by Mosley, 1987; Mosley, Harrigan and Toye, 1991; Mosley, 1992):

(1) No collateral is demanded by the lender

(2) The lender imposes policy conditions

(a) as a substitute for collateral to increase the probability of repayment

(b) to promote economic development to a more capitalist-based economy, usually involving the removal of a protective shield against market forces such as exchange controls, import licensing, price controls or food subsidies

(c) increasingly, to encourage political development to a more democratic system, and also to promote "good governance" in light of recent high-profile corruption scandals (for example, in Russia in 1999)

(3) The recipient may be tempted to renege on its promises to comply with conditions because there are:

(a) political costs for the recipient government

Drazen (2000) suggests that countries face the following political constraints in implementing reforms: opposition to reform/ vested interests/ heterogeneity of voters; uncertainty, incomplete information and/ or asymmetric information; time inconsistency problems especially where there is majority rule *and* asymmetric information; and the degree of complementarity of reforms.

(b) economic costs for the recipient government

Drazen suggests the following economic constraints: unavailability of capital to implement reforms; delay in implementing some welfare-improving policies may make it optimal to postpone the removal of other distortions even though immediate removal of these distortions is economically feasible; and significant economic problems related to incomplete information about the post-reform environment (for example, risk aversion).

(c) lags between implementation and results

A lag between the implementation of a reform programme and the emergence of concrete empirical results from implementation may provide incentives for the recipient to mislead the donor about whether he has implemented the reform programme. In practice, IMF policies

and targets are often macroeconomic, and non-compliance can be picked up in a matter of months.

Thus the decision to implement conditions, like the decision to repay a loan, is therefore subject to moral hazard.

(4) Lenders can punish breach of conditionality by refusal of further credit. In fact, non-compliance, and its associated moral hazard problem, can be minimised by releasing the loan in instalments or *tranches*. Indeed, the IMF usually delivers loans in tranches, each tranche conditional both on success in attaining the required economic targets in the previous period(s), and the commitment to future reforms.

In this chapter, we discuss how the recipient government may avoid full implementation of conditions without jeopardising future loans by playing a strategic game with the donor.

During conditional development lending, especially in the case of Russia, the IMF has released further tranches without the attainment of prior targets. We suggest that this is the result of a *fourth* feature of conditional development lending that may tempt the recipient to renege on its promises to comply with conditions, and which cannot be resolved by releasing the loans in tranches. We suggest that the recipient is, in fact, aware that the donor is motivated not just by *economic* considerations but by its own *political* interests in the conditional development lending process, and that these political incentives are a factor in determining the donor's degree of *tolerance* of non- compliance with economic reform programmes. Thus there ensues a game in which the recipient, aware that the donor has political motivations, attempts to undertake the least level of compliance that guarantees it future loans, and the donor

adopts a punishment strategy consistent with its own political and economic motivations.

The political motivations of lenders stem from a number of factors. For instance, donor agencies, such as the IMF, are controlled by the Board of Governors which consists of representatives of the member countries. These representatives protect the economic and political interests of their countries. Thus is hardly surprising that on occasion, political motivations may conflict with economic ones. For example, it is the assertion of this chapter, and thesis as a whole, that the IMF continued to lend to Russia without sound economic basis because it was a political objective of IMF member countries, such as the USA and the UK, to eradicate communism from the former USSR.

In some cases, the donor invests part of its reputation in the economic and political reform of the recipient country, and this makes it politically costly for the donor to acknowledge that the recipient has failed to comply with conditions.

More recently, the rise in anti-globalisation protestors has made donor agencies want to appear accountable.

We model the game between the recipient and donor in section 2.3, in which the recipient chooses its level of compliance with policy conditions and the donor decides whether or not to extend further financing. We solve for the subgame perfect Nash equilibrium.

We find that the lender's decision to refinance depends not only on the recipient's level of compliance, but also on a trade-off between the economic gains from withholding further loans (as the loans can be reallocated elsewhere) versus the political costs of withholding finance. The recipient's choice of compliance level

depends on the likelihood of receiving further finance and on a trade-off between the economic gains of compliance (more loans) versus the political costs of compliance (within the recipient's country).

We go on to propose three rules of thumb that a lender might adopt, because of its internal conflicts, in an attempt to regulate these conflicts. The three rules of thumb are: *No Re-lending; Reward Only Full Compliance;* and *Leniency*. The recipient considers the relevant rule of thumb, and undertakes the necessary amount of compliance to maximise its payoff function. We discuss the types of situations under which each rule of thumb might be adopted, and how the rules of thumb change in response to shifts in the parameters in the utility functions.

The model differs from existing theories in explicitly allowing the lender and recipient to face a trade-off between political and economic interests within their organisations which affect the degree of slippage or the tolerance of policy slippages. Furthermore, the adoption of "rules of thumb" allows the donor to behave differently to two countries that implement the *same* proportion of required conditions, or to one country which implements the same proportion of required conditions over two different time periods.

In effect, this model helps to bridge the large gap between theory and practice in conditional development lending which was highlighted by the attitude of the IMF and other donor agencies to post-Soviet Russia. Indeed, existing literature on theories of conditionality fail to characterise the relationship and predict the outcomes in the Russia-IMF relationship.

The chapter is organised as follows. In section 2.2 we examine the current theoretical literature. The simple static two-person two-period game is developed in section 2.3. In section 2.4 we analyse how the relationship between Russia and the

IMF from 1992-2002 displayed aspects of the game developed in section 2.3. Section 2.5 discusses the limitations of, and possible extensions to, the model. Section 2.6 concludes.

2.2 Current Theoretical Literature

An extensive literature evaluates the impact of policy conditionality, but much less attention has been paid to the *theory* of conditionality.

Mosley (1987, 1992) models conditionality as a static bargaining game between a recipient and a donor in which conditions are imposed by donors and accepted, usually unwillingly, by recipients. He ascribes only economic objectives to the donor except for an exogenous parameter that indicates the subjective utility attached by the donor to one extra condition negotiated with the recipient and solves for the Nash equilibrium.

White and Morrissey (1997) provide a framework for examining conditionality in which recipients may wish to execute economic reforms, and need financial assistance to do so, but are unable to implement all conditions. However, White and Morrissey too ascribe only economic objectives to the donor. Eaton *et al.* (1986) and Anderson *et al.* (1989) analyse the enforcement of debt service by the World Bank within a game-theoretic framework. They show that conditionality strengthens enforcement: a result that merely describes one of the functions of conditionality rather than the theory of conditionality. Killick (1995,1996) evaluates the *effectiveness* of policy conditionality in a principal-agent framework in which the recipients (the agents) implement conditions desired by the donors (the principals).

2.3 Simple Two-Person Two-Period Game

The relationship between the recipient government and a lender has elements of a game: players, strategies, and payoffs which are contingent on the actions of all the players in the game.

There are two players: the recipient government and the lending organisation. Mosley (1992) divides the conditionality game into three periods.

(1) An initial negotiating process (Act 1) in which donor and recipient try to agree on the conditions that are to be attached to a development loan.

(2) An implementation process (Act 2) in which the recipient decides how far to honour the promises it made during Act 1. The recipient has two strategies: "total compliance" or "partial/zero compliance".

(3) A response by the donor in the following period consisting of a decision to grant or refuse further finance to the recipient in light of the recipient's performance during Act 2. The donor has two strategies: "full finance" or " no finance".

The model to be developed in this chapter concentrates on the game that takes place in Acts 2 and 3 of Mosley's model (henceforth periods 1 and 2).

In period 1 the recipient decides how far to honour the conditions that have been imposed by (or agreed with) the donor. That is, the recipient fulfils pN of conditions, where N is the total number of conditions and p $(0 \leq p \leq 1)$ is the proportion of conditions fulfilled (the recipient's compliance). We ascribe two possible strategies to the recipient: *comply*, and *default*.

With the strategy of *compliance*, the recipient fulfils all the conditions, political and economic, that are attached to the loan. With the strategy of *defaulting*, the recipient fulfils *some*, or *none*, of the conditions that are attached to the loan.

The recipient's choice of level of compliance (p) depends on his assessment of the donor's tolerance of non-compliance in the next period and the payoffs that accrue from his decision. Given the political costs (α) to the recipient of policy compliance, the recipient aims to undertake the least amount of compliance that will guarantee it future loans.

In period 2, the lender decides whether to extend financing in the form of another loan/ tranche, and provides further loans to a non-compliant recipient with a probability of γ. The lender has two options, or strategies, in this period. These are: *re-lend*, and *withhold further finance*.

With the strategy of re-lending, the donor extends the loan to the recipient in the second period. With the strategy of *withholding further finance*, the donor extends no loans to the recipient in the next period.

The donor and recipient face different payoff functions.

Payoff to the recipient

The payoff received by the recipient is given by:

$$U_i = f\left(L^t, \gamma\delta L^{t+1}, p, \alpha\right)$$

where:

L^t is the value of the loan obtained from the donor for the first period

L^{t+1} is the loan the recipient expects to receive in the second period

γ is the probability that the recipient will receive further finance, given non-compliance

δ is the discount factor, $\delta = \frac{1}{1+r}$ where r is the rate of interest

p is the *weight* the recipient attaches to the fulfilment of the conditions, $0 \leq p \leq 1$, and represents the *proportion* of conditions to be fulfilled

α represents the political cost to the recipient of complying with the donor's conditions.

The utility of a recipient depends positively on loans, but negatively on the number of conditions attached to the loan. For each strategy s_i the utility function is linear and of the form:

$$U_i = L^t + \gamma\delta L^{t+1} - p\alpha N$$

N does not vary across strategies. Let $L^t = L^{t+1} = 1$ for simplicity. The utility function can then be written as:

$$U_i = 1 + \gamma\delta - p\alpha N$$

Payoff to the lender

The payoff received by the lender is given by:

$$U_j = f\left(\delta L^{t+1}, p, \beta, \pi\right)$$

where:

L^{t+1} is the value of the loan the donor is to give to the recipient in period 2

β represents the political benefit to the donor of compliance with the donor's conditions

π represents the political costs of withholding finance

There is a positive gain to the lender of the recipient's compliance of $p\beta N$, *for* $1 \geq p \geq 0$. If the lender withholds further financing, there is a positive gain to lender equal to the discounted value of the second tranche that can now be reallocated elsewhere; it is like a free good. However, in this case, the lender will pay

a political price that arises from its (exogenous) internal political conflicts: a high price equal to π if the lender fails to reward full compliance, or a lower price equal to $p\pi$ if the lender is recognised to be legitimately punishing the recipient's non-compliance.

Thus the utility of a donor depends positively on compliance, positively on loans it can reallocate elsewhere, and negatively on the political costs it faces for not granting further finance. For each strategy s_j the utility function is of the form:

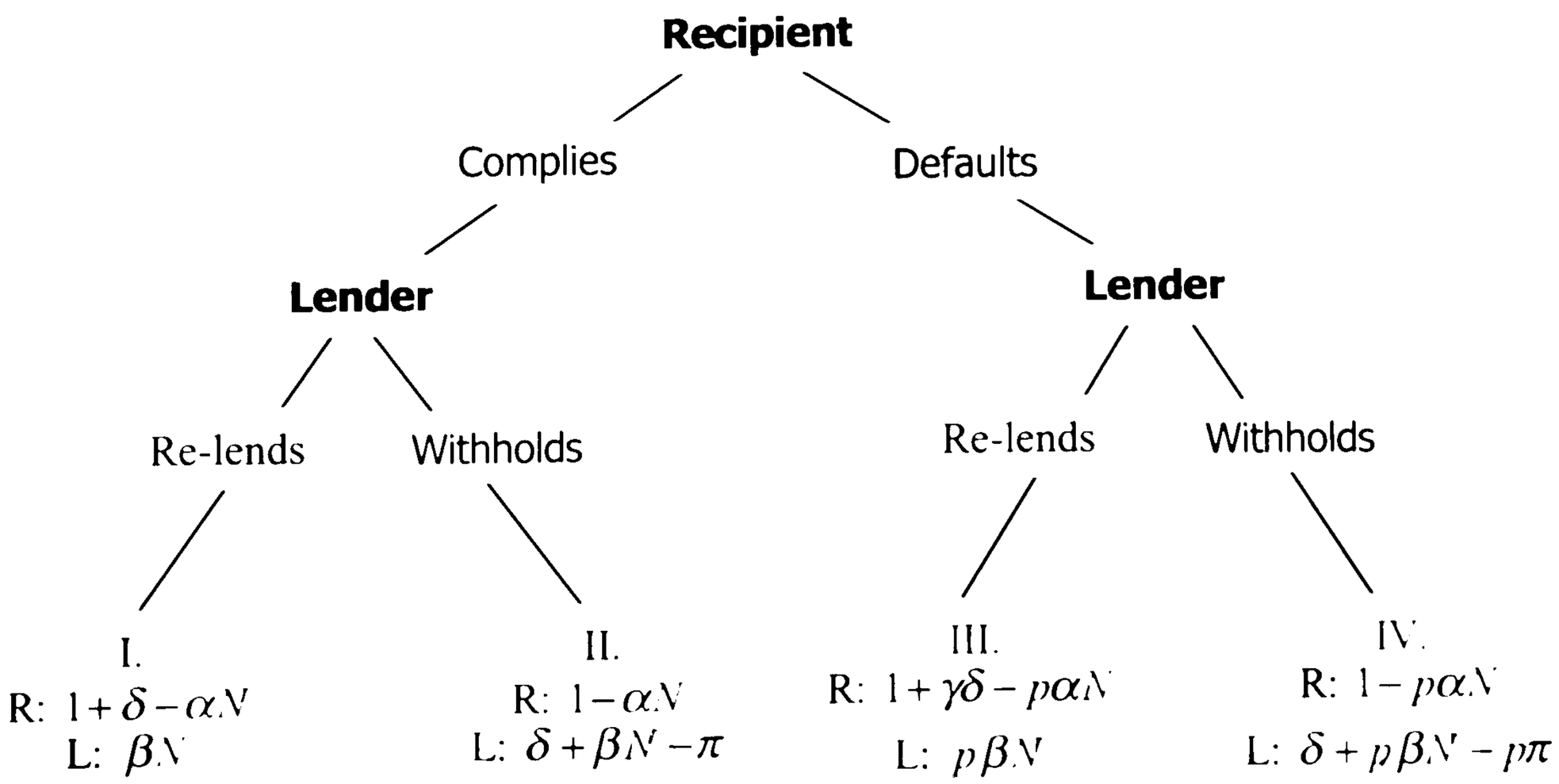
$$U_j = p\beta N; \quad for\, 1 \geq p \geq 0 \text{ if the lender re-lends}$$

and $$U_j = p\beta N + \delta - p\pi; \quad for\, 1 \geq p \geq 0 \text{ if the lender withholds finance.}$$

Payoffs for each combination of strategies

The payoffs to each player can then be computed for each combination of strategies chosen by it and the other player. Let $u_1(s_i, s_j)$ be the payoff to the recipient (player 1) as a function of the strategies chosen by both players. Let $u_2(s_i, s_j)$ be the payoff to the lender (player 2) as a function of the strategies chosen by both players. This is shown in the diagram below:

Figure 2.1: The extended form of the game with payoffs



We solve for the subgame perfect Nash equilibrium by backwards induction.

Firstly, we consider the lender's payoffs and strategies.

I. If the recipient complies fully and $\beta N > \delta + \beta N - \pi$, i.e. $\delta < \pi$, the lender will re-lend.

II. Even if the recipient complies fully and $\delta > \pi$, the lender will withhold financing.

III. Even if the recipient defaults and $p\beta N > \delta + p\beta N - p\pi$, i.e. $\delta < p\pi$, the lender will re-lend.

IV. If the recipient defaults and $\delta > p\pi$, the lender will withhold financing.

Secondly, we consider the recipient's payoffs and strategies, given the strategies of the lender.

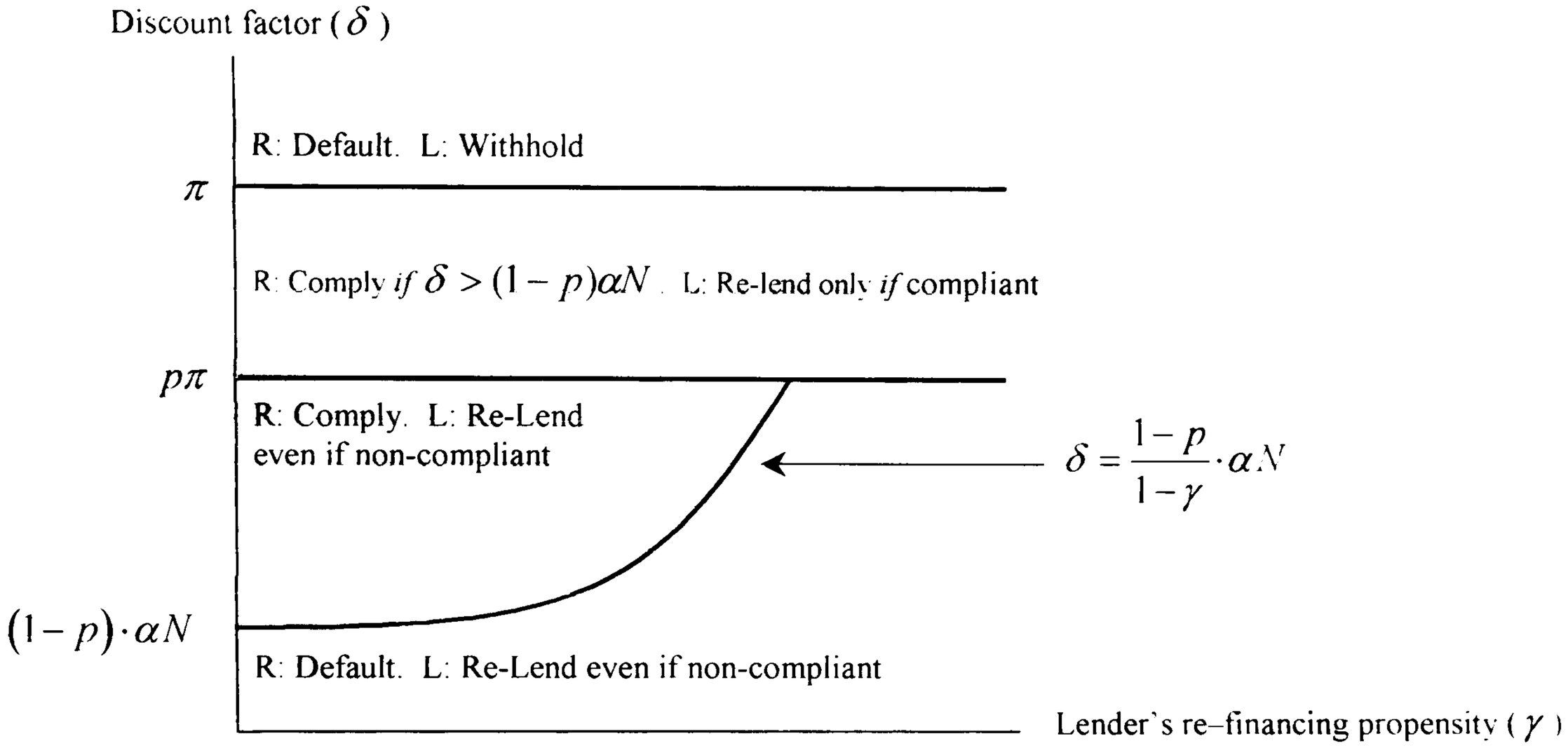
A. If $\delta > \pi$ the lender will always withhold, and as $1 - p\alpha N > 1 - \alpha N$ the recipient will always default.

B. If $\pi > \delta > p\pi$, the lender will only withhold in cases of non-compliance, and the recipient will choose to comply if $1 + \delta - \alpha N > 1 - p\alpha N$, i.e. $\delta > (1 - p)\alpha N$.

C. If $\delta < p\pi$, the lender will re-lend to a non-compliant recipient, and the recipient will choose to comply only if $1 + \delta - \alpha N > 1 + \gamma\delta - p\alpha N$, i.e. $\delta > \frac{1-p}{1-\gamma} \cdot \alpha N$.

This can be illustrated as follows:

Figure 2.2: A summary of the equilibria of the two-period game



An area of particular interest is that below the curve $\delta = \frac{1-p}{1-\gamma}\alpha N$ where the recipient does not comply and the lender re-lends.

The internal conflict the lender faces affects the values of $\beta, \pi, and\ \delta$. In the case of Russia and the IMF, the internal conflict, and hence these parameters, shifted as Russia evolved into a market economy - for example, the political cost π of withholding finance lessened as the threat of Russia reverting to Communism diminished.

We propose that a lender may attempt to create rules under which lending decisions are made to regulate the internal conflict and to provide a coherent and consistent lending policy. These rules are decided in an exogenous conflict between politics and economics that takes place within the donor agency as to the circumstances under which punishment is levied. This conflict, *in effect*, determines the donor's degree of tolerance for policy slippages and helps fix the value of π in relation to δ. In Section 2.4 we suggest that from 1992-2002, as the Russian

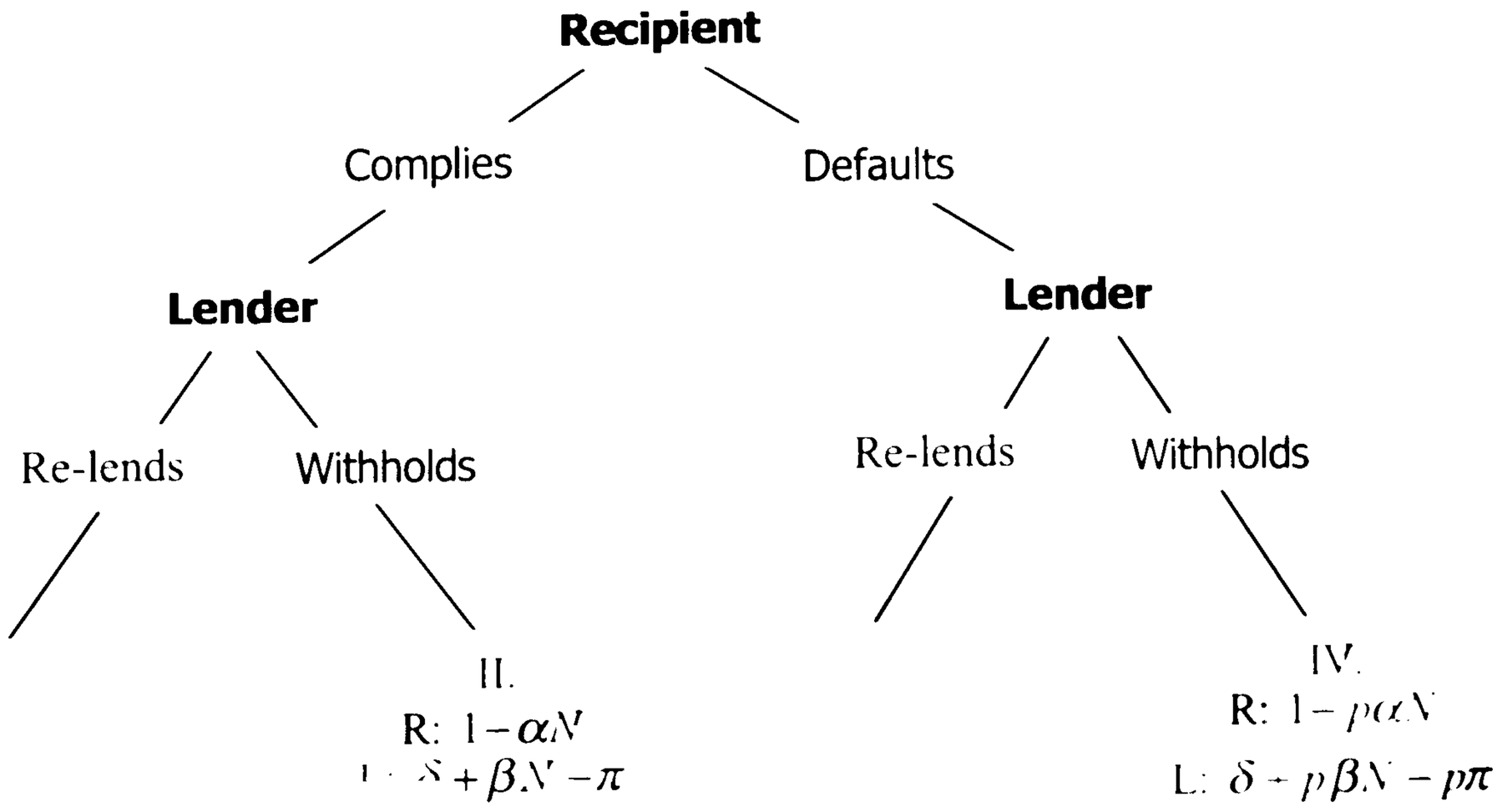
economy evolved more and more towards a market economy, there were distinct shifts in these parameters (and hence the rules) in response to particular actions by the Russian. We suggest three main types of rules that arise from the politics-economics split within the donor agency. The subgame perfect Nash equilibrium for each type of rule is solved by backward induction

Rule (1): No Re-lending $(\delta > \pi)$

No level of compliance is sufficient to ensure further financing. This rule corresponds to the top tier of diagram 2.2. Here, the issue is not so much just about the economic conditions in the recipient country but also about the political conditions. Perhaps, a recent coup d'état has ushered in a government deemed to be undesirable by the donor agency and the international community at large. Alternatively, perhaps a democratically elected government is deemed to be undertaking human rights abuses and is therefore not a "suitable" recipient of loans. In Section 2.4 we suggest that the IMF adopted a 'no re-lending' policy with respect to Russia between the end of September 1999 (when funding was withdrawn for alleged misuse of funds) and December 31st 1999 (when President Yeltsin resigned).

The extended game with payoffs is given below.

Figure 2.3: The extended form game for Rule 1



The lender always chooses to withhold further finance, and as $1-p\alpha N > 1-\alpha N$ (for p<1), the recipient will always default on the conditions attached to the loan.

This rule of thumb also seems to have been applied to Pakistan's military government (led by Colonel Musharraf) *before* September 11, 2001. The international community pressed for a return to democracy and withheld aid and loans to Pakistan. After the terrorist attacks of September 11th in America, this same military government was now deemed to be a worthwhile "ally" and full loans and aid were resumed to Pakistan without any change in the domestic economic conditions.

Result 1:

> *The equilibrium for the rule "no re-lending" is default, withhold. That is, the lender will always choose to withhold further finance and the recipient will always choose to default.*

Rule (2): Reward only full compliance $(\pi > \delta > p\pi)$

The lender has no tolerance for policy slippages, and will punish any deviation from a full compliance strategy on the part of the recipient. This rule corresponds to the middle tier of diagram 2.2.

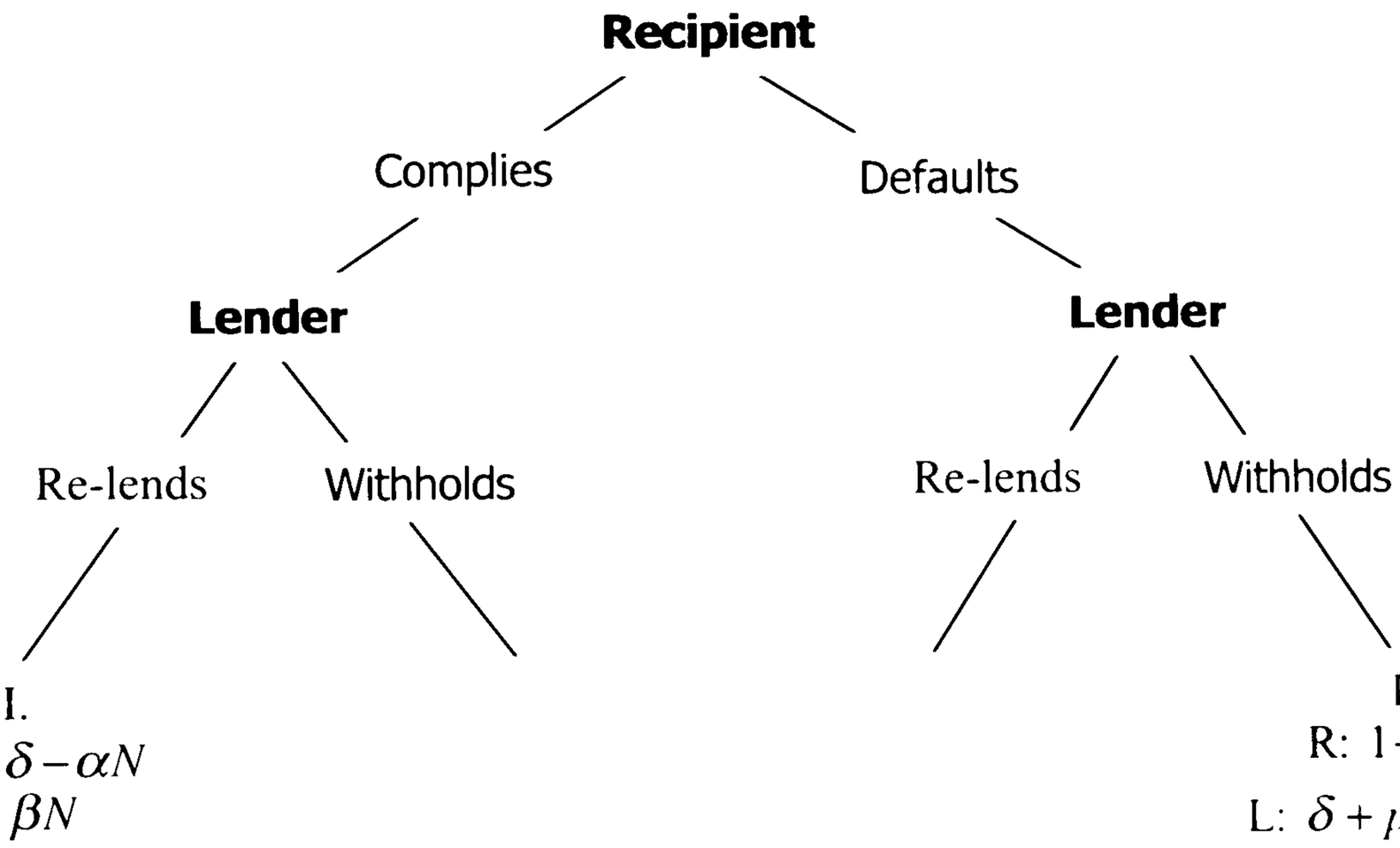
There could be a variety of reasons for this strategy: the donor clearly maintains an economic and political interest in the country concerned, and yet punishes any slippage in policies. This stance corresponds to a "harsh parent" stance, in which a seemingly errant "child" (the recipient government) is kept in line with a very short leash.

A donor that acts like this may be adopting a particularly strict political stance with respect to this country, perhaps because it is not co-operating on key

international political/ human rights agreements. In section 2.4 we discuss how the IMF's adoption of an unusually hard line stance with Russia in 1999 with respect to the last $3.4 billion loan under the extended Fund facility programme, led to much debate about the IMF's *political* motivations.

The extended game with payoffs that relate to this particular game is given below.

Figure 2.4: The extended form game for Rule 2



There are two equilibria: *comply, re-lend*; and *default, withhold*. The recipient will choose to comply if $1+\delta-\alpha N > 1-p\alpha N$, that is, if $\delta > (1-p)\alpha N$. In which case the lender will offer further finance. If $\delta < (1-p)\alpha N$, the recipient will renege on its promises to comply with conditions, and the lender will withhold further finance.

Result 2:

If the donor has a "reward only full compliance" rule about further financing, the recipient will choose to be fully compliant if the value of discounted future

loans are of greater benefit to it than the immediate political benefits of non-compliance, and will choose to be non-compliant if not. If the recipient is fully compliant, the donor will offer further finance. If the recipient is non-compliant, the donor will withhold further finance.

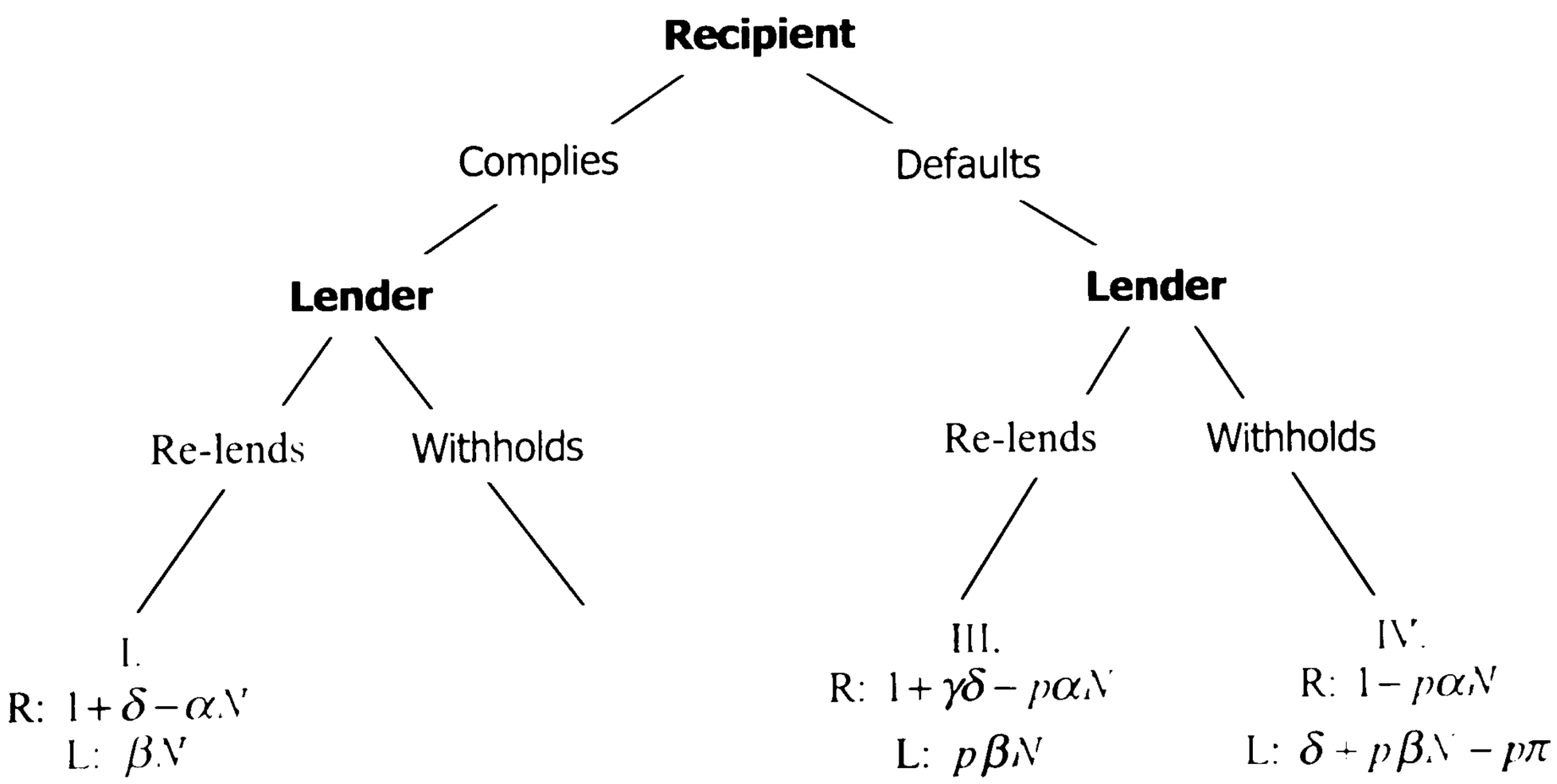
Rule (3): Leniency $(\delta < p\pi)$

The donor has tolerance for policy slippages depending on the circumstances of the recipient country. Unlike with Rules (1) and (2), there is the possibility (γ) of receiving further finance for non-compliance. . This rule corresponds to the bottom tier of diagram 2.2.

In Section 2.4 we discuss how the IMF's continuous lending to Russia from 1992-1998, despite serious policy slippages, seemed overly generous and driven by politics rather than economics.

The extended game with payoffs that relate to this particular game is given below.

Figure 2.5: The extended form game for Rule 3



The equilibria depend on the relative values of the parameters in the payoff functions.

If $\delta > \frac{1-p}{1-\gamma} \cdot \alpha N$, the recipient is compliant and the lender offers re-finance. If $\delta < \frac{1-p}{1-\gamma} \cdot \alpha N$, the recipient is non-compliant, and the lender offers re-finance with a probability of γ.

Result 3:

If the donor punishes recipients who implement less than 100% of the conditions attached to the loan with a probability of $1-\gamma$, *then the recipient will choose to fully comply with conditions as long as value of discounted future loans exceeds the immediate political gain from policy slippage. If the gain from policy slippage exceeds the cost associated with the loss of further finance, the recipient will be non-compliant. The recipient's choice of compliance level depends on the discount rate attached to the future loan, the political costs of compliance, and on the probability of punishment.*

2.4 The Game between the IMF and Russia: 1992-2002

The Players

The Russian Government/ Authorities

In July 1991 the Soviet Union applied for associate membership of the IMF. This would give it access to technical advice but not financial assistance. One week later the Soviet Union applied to IMF for full membership. This caused some debate about what type of membership to afford Russia. The Economist (3 August, 1991) suggested that the American government was the biggest opponent of granting the

Soviet Union full membership. The American government argued that associate status could be granted in one month, but full membership could take years (although applications from Czechoslovakia and Bulgaria were approved in 9 months). Furthermore, they argued that the Soviet Union should *first* move further towards a market economy and a convertible currency (but the IMF only requires a *commitment* to move towards currency convertibility).

The Economist analysed the reasons are behind America's reluctance to grant the Soviet Union full membership. It noted that the IMF had increased its quotas by 50% to meet the increased demand for capital from Eastern Europe and Latin America. However, the American Congress was reluctant to provide the money. In general, any increase in quotas has to be approved by the governments of member countries. A vote with at least 85% of total quotas is required to ratify any increase in quotas. America's vote (at that time about 20% of total quotas) was therefore crucial, and Congress was less likely to provide the money if the Soviet Union was allowed to borrow from the IMF. Another reason behind America's reluctance to provide the Soviet Union with full membership, reasoned the Economist, was that assessing the Soviet Union's quota will be problematic and complicated. In addition it was likely that this would upset the balance of power on the Executive Board.

However the Economist concluded that the vote for Soviet Union membership (after all the relevant data has been collected, the quota calculated, and the conditions for membership considered) would be by a simple majority - America could not block Soviet membership on its own.

On October 5 1991, the IMF and the USSR established a Special Association (this temporary arrangement allowed IMF policy advice and technical assistance to be made immediately available to the USSR). Between November 1991 and April 1992

the IMF undertook pre-membership economic reviews of all the 15 states of the former USSR. The USSR officially broke up on 25th December 1991, five days before the 69th anniversary of the founding of the Soviet Union. Russia was accepted as a member of the IMF in April 1992, allowing it to qualify for substantial loans from the IMF conditional on certain reforms.

The International Monetary Fund

The *purpose* of the International Monetary Fund (IMF) is to "promote international monetary co-operation, to facilitate the expansion and balanced growth of international trade, to promote exchange rate stability, to assist in the elimination of trade restrictions and the establishment of a multilateral system of payments, to give financial assistance, and to reduce imbalances in the international balances of payments of member countries" (Article 1 of the Articles of Agreements).

The IMF fulfils its responsibilities by regularly surveying the domestic and external situation of member countries, providing technical and financial assistance to countries when requested, and making the availability of its financial resources to a country conditional on the implementation of appropriate adjustment policies (to reduce moral hazard).

The IMF exercises surveillance in two main ways. Firstly, members of staff meet regularly with the authorities of each member country to gather current economic and financial information and to review economic policies and developments. The nature of these consultations depends on characteristics of member countries and on the current external economic situation. The staff papers are discussed by the IMF's permanent decision-making body, the Executive Board

(henceforth, the Board). The Board is composed of 24 Directors who are appointed by member countries or are elected by groups of countries.

Secondly, there are regular discussions by the Board on the outlook of the world economy. The *World Economic Outlook* is published twice a year by the International Monetary Fund and forms the basis of regular reviews by the Board and Interim Committee on the economic policies of member countries and their effects on the international monetary system. The Interim Committee is composed of the 24 members of the Executive Board and meets twice yearly to decide IMF policy.

The IMF is vulnerable to political bias because the USA and other major donor governments on the IMF's decision-making boards are a major influence on IMF lending decisions, and the IMF's shareholders are effectively also its clients. Additionally, the IMF does need to (a) get its money back to establish and maintain its reputation as a viable international financial institution, and (b) continue to lend to ensure profit. Furthermore, the severe economic and social costs that arise from the IMF's reform policies require that the IMF remain supportive towards reforming governments to ensure that they continue with reform (and to ensure that the IMF gets its money back). The rise in anti-globalisation protestors in recent years has raised questions about the conduct of donor agencies in developing/ emerging markets.

Until recently, the IMF only took the attainment of economic targets into account when deciding whether or not disburse further loans. However, the proliferation of corruption in many societies has for a long time, become of increasing concern to the donor community. The IMF has begun to make loans conditional not only on certain *economic* reforms but also on certain *political* ones. That is, the "basic soundness of government institutions with which they are dealing" (Rajghatta, 1997). In 1997 the IMF adopted new guidelines allowing it to withhold aid to

countries where it believes corruption is so widespread as to harm the IMF's goals of economic recovery. In particular, "financial assistance from the IMF....could be suspended or delayed on account of poor governance...if there is reason to believe it could have significant macroeconomic implications that threaten the successful implementation of the program, or puts in doubt the purpose of the use of IMF resources" (Rajghatta, 1997).

There are a number of financial arrangements that the IMF can make with member countries. In general, loans from the IMF depend on the problems facing the country and on the degree of conditionality that is attached to the loans.[1] Types of financial assistance include a *stand-by arrangement* (mainly for short-term problems), *structural adjustment facility* (SAF) (medium term problems), and more recently the *systemic transformation facility* (STF). The STF is a temporary financial facility to help the transition process from central planning to a market based economy. Certain conditions are attached to the STF. Not only must the country provide a written statement of its policy objectives and measures to be used to accomplish these objectives, it must also undertake significant policy actions prior to the receipt of the loan. In addition it must agree not to raise trading barriers and to allow currency convertibility.

Strategies, Payoffs, and The Game

Since Russia joined the IMF, the IMF has lent Russia several billions of dollars conditional on the achievement of certain macroeconomic and structural targets which Russia has consistently failed to achieve. Despite Russia's inability to achieve the targets set by the IMF, the IMF has continued to lend it money (albeit

[1] Guitian (1995) analyses IMF conditionality since the 1940s.

halting the loans for short periods of time). For example, *The Economist* (26 March 1994) notes that in 1993/94 Russia fell far short of its macroeconomic targets: for example the monthly inflation rate was 12% instead of 8% at the end of December 1993. And yet the IMF agreed to release $1.5 billion systematic transformation facility (STF) to Russia. *The Economist* asks whether the IMF bowed to political pressure.

Russia's failure to implement or to adhere to reforms was acknowledged officially by Russia in 1999 in a Letter of Intent from the Russian government and the central bank of Russia in connection with the economic crisis of August 1998:

> We readily acknowledge that these fundamental elements of the crisis reflect, in part, the fact that implementation of the government's economic program, over the past several years, has been incomplete. Further, in certain respects, weak implementation has served to worsen structural problems. In particular, the inability of the government to enforce cash payment of statutory tax liabilities and to pay its own bills in a timely fashion has played a significant role in the spread of the nonpayment problem. Moreover, potential benefits from reforms, most significantly privatization, have been diminished owing to the absence of transparency in the process and a failure to ensure that economic gains were broadly distributed among the population, and this has served to dampen public support for the reform process in general.

Russia, the IMF and other commentators have blamed Russia's failure on a number of factors including: a lack of strong leadership, an opposition-dominated parliament, political blockages (Skidelsky and Clark 1998) and powerful interest groups (Polushchuk (1998)); corruption; and worker-controlled firms (Blanchard 1997).

While we agree that the factors above did contribute to lower Russia's ability to comply with conditions, we suggest that this is not enough of an explanation. We suggest that, as in our model in section 2.3, Russia's awareness of the IMF's political intentions and interests in the country made it also aware that the possibility of punishment $(1-\gamma)$ was low. In fact, prior to 1998, we would postulate that $\gamma \to 1$. For example, the IMF Annual Report (1995) noted that in Russia output continued to decline precariously. It admitted that slippages in policy had exacerbated the decline in output, jeopardised the credibility of reform efforts, and created an uncertain investment climate. In addition, the conflict in Chechnya from December 1994, which was much criticised by world leaders and organisations, added pressures to an already difficult fiscal position. And yet, the IMF sanctioned more loans.

The following year, in the World Economic Outlook (1996) the IMF noted that a key concern for the Russian economy was inflation and weaknesses in government finances continued to be a cause for concern. The government deficit had been reduced through a reduction in expenditures but revenue performance was poor because of the lack of reform of the tax system.

In late October and November 1997, and in late January 1998, spillovers from the Asian crisis contributed to the attack on the ruble. The authorities defended the exchange rate by raising interest rates sharply. This was associated with steep declines in the stock market. The external current account was close to balance but the weak fiscal position characterised by poor revenue collection, and a decline in oil prices further weakened Russia's position. Yet in May 1998, the IMF's management outlined the conditions for a loan of $670 million about to be released to Russia on completion of a review by the Executive Board (IMF, May 1998). It stressed fiscal balance, firm monetary control and continued progress with structural reforms as

important for stronger economic growth and lower inflation, and strongly recommended that Russia should avoid devaluing the ruble. The IMF suggested that this would re-establish confidence in the ruble and hence financial stability.

However, the attack on the ruble continued. On August 17 the Russian authorities announced a number of emergency measures to deal with the growing loss of investor confidence in the country's fiscal and international payments position. These included a devaluation of the ruble (without supportive macroeconomic policies), a unilateral restructuring of public debt, and a 90-day moratorium on foreign credit repayments.

This marked a turning point in the attitude of the IMF towards Russia, and there was a noticeable reduction in its tolerance for non-compliance with policy conditions.

We postulate that up till August 17th 1998 the relationship between the IMF and Russia corresponded to the game that takes place in section 2.3 under Rule 3 (*leniency*) where the probability of punishment, $1-\gamma$, is very low.

Then, from August 18th 1998 the IMF seemed to adopt Rule 2 (*Reward only full compliance*). In early 1999, a framework for a new program of policies was agreed between Russia and the IMF. Then, in mid-1999 the IMF adopted a hard-line stance with Russia with respect to the last $3.4 billion loan under the extended Fund facility programme. Conditions included restructuring the banking system and restructuring budget arrears. The Russian government thought that the IMF would, once again, lend it money without evidence that the conditions of the loans were being carried out. In fact, Russian government officials made statements to the effect that the IMF had no choice but to extend loans to Russia, if only to repay Russia's debt to the IMF itself. But the IMF continued to adopt its new stance. Camdessus is

reported to have stated that "It would be a disservice to Russia to make them loans on complacent terms. We will not do that".[2] This unusual hard-line stance lead to much debate. What had caused the IMF to change its approach to Russia?

One argument is that the IMF was acting on behalf of the United States. The IMF's economic demands apparently coincided with pressure from America for Russia to "speed ratification of the START II Treaty, soften its positions on Kosovo and Iraq, curtail its cooperation with Iran in the field of nuclear power, and curb its activities in the arms markets of China, India, Syria, and other countries".[3] This was a popular view taken by the Soviet press. In previous stalled negotiations between the IMF and Russia the U.S. always stepped in to resolve difficult issues. This time, the U.S. was keeping quiet, allowing the IMF to dig its heels in. This caused many questions to be asked. Kucherenko (March 4, 1999) summarises the dilemma:

> The Fund voiced no objections when our reformers began building a pyramid of debt that was obviously going to end in disaster, dooming our nation's financial system to collapse. Year after year it ignored the payments problem and the insufficient supply of rubles, which led to a situation in which government short-term bonds (GKO's) utterly consumed the federal budget. It was unfazed by the whole misshapen structure of Russia's "pre-August" economy, which was based on altogether barren, speculative transactions. It was likewise unfazed by the utter chaos that reigned in our tax collection system. Finally, the IMF was perfectly aware of preparations for the Aug. 17 crash.....
> For the first time, tax collection totals for January exceeded the figures for December. But the IMF refuses to acknowledge this. Which is strange, and seemingly illogical: When taxes were being collected with far less success, the IMF was pleased with us. The moment we make some progress in this area, we're told we're incapable of collecting taxes....

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[2] Reported by Ulyanova, March 3, 1999

Officially, the IMF is not making any political demands. At the same time, however, its demands are being made against a backdrop of certain events. The US is currently putting tremendous pressure on Russia.....

Others disagreed with this argument. They suggested that the IMF was "bending over backwards to find a new way to make loans to Russia without losing face on account of any excessively flagrant violation of the Fund's rules and operating principles" (Latsis, March 4, 1999).

Other commentators pointed out that it was actually Russia who would benefit the most from a proper budget, not the IMF, and as such it was in Russia's interests to accept and implement IMF conditions.

Another view suggested that the government's opposition had brewed an unnecessary storm over its negotiations with the IMF. This was intended to make the government unpopular. In response to this gesture Yury Maslyukov (the First Deputy Prime Minister), was unnecessarily declaring national interests were not served by accepting IMF conditions. He is reported to have said "certain terms are simply inappropriate for Russia." For instance, "we're being asked to do such things as set up trade-monitoring organizations in the natural-gas industry, which would bring the thieves crawling out of the woodwork" (Ulyanova, March 3, 1999).

The matter appeared to be resolved when Russia issued a Letter of Intent on July 13 1999 accepting IMF conditions. However the IMF continued its hard-line stance and in September released a statement which said that "the IMF, through the routine process of monitoring its lending programs, is scrutinizing the Russian authorities' policy implementation. If the IMF's Executive Board concludes that

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[3] Reported by Bekker, March 4, 1999

Russia failing to meet program commitments, it will consider suspending further disbursements, as it has done on several occasions in the past." (Camdessus, September 13, 1999). This IMF policy of 'reward only full compliance' lasted until the end of September that year.

As predicted by Rule 2 in 2.3, if the donor adopts an all-or-nothing stance then the recipient will fully comply with conditions in order to gain further finance if future loans are of greater benefit to it than the immediate political benefits of non-compliance. Putin noted that Russia had met its budget goals for 1999 (in spite of the fact that the IMF has suspended loan payments since September).[4] This assertion was backed by Michel Camdessus, the Managing Director of the IMF. He reported that Russia had met objectives in economic growth, lower inflation, fiscal balance, and international reserves. However he said that Russia had not completed some structural benchmarks for end-September 1999 as outlined in the Statement by the Russian government (Camdessus, M. 1999).

We postulate that as the IMF was adopting an all-or-nothing stance with respect to the next tranche of the loan, Russia attempted to convince the IMF that it had, or was intending to, fully comply with conditions. However, mainly because of political blockages, which are approximated by the variable α in our model, Russia did not fully comply with conditions. Result 2 suggests that this was because $\delta < (1-p)\alpha N$, that is, the value of discounted future loans was of less benefit that the immediate political gains from non-compliance.

Then at the end of September 1999 we postulate that the IMF seemed to adopt Rule 1 (No re-lending) by withdrawing finance from Russia, not for "failing to meet program commitments" but for *alleged* misuse of funds. This was an interesting

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[4] *Russia's objectives met despite IMF: Putin*, Dawn, 28 December 1999

precedent, because even though there have been alleged misuses of IMF funds in Russia since 1992 and in other countries for decades, the IMF had rarely done anything about it. Nonetheless to ensure that IMF funds were not misused, all money that was paid out to Russia was to be held by the IMF and loan repayments to the IMF will be taken from that account. These arrangements were:

"a response to the FIMACO episode, in which the Russian central bank hid from the IMF its use of an offshore subsidiary to handle some of its foreign reserves. That affair, which did not involve money laundering, has been extensively examined at the IMF's insistence by the accounting firm PricewaterhouseCoopers. The Russian authorities now understand that any future efforts to hide the true level of foreign reserves from creditors can result in loan suspension". [5]

Rule 1 predicts that if the donor adopts a 'no re-lending' policy, the recipient will always default. In practice , this rule was only observed in Russia for about three months because the political environment under which corruption and money laundering flourished was abruptly changed when President Yeltsin announced his resignation on December 31st 1999. He was succeeded by President Putin who was liked by the 'West', and in our model in section 2.3, this resulted in a shift in α in the recipient's utility function, and in a shift in the relative values of $\pi and \delta$ in the donor's utility function

Indeed, since the year 2000, Russia has been implementing many of the IMF reforms. For instance, a new Tax Code, which had been rejected by the Duma on many occasions, was eventually passed, enabling the Russian authorities to improve

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[5] Camdessus, September 13 1999

[6] *Russia's objectives met despite IMF: Putin*, Dawn, 28 December 1999

the fiscal situation that was partly responsible for the August 1998 economic crisis. In return, the IMF has been continuing to provide further finance to Russia.

We suggest that since the year 2000 the relationship between the IMF and Russia again corresponds to the game that takes place under Rule 3 ('leniency'). However, the probability of punishment, $1-\gamma$, is now higher than it was from 1992-1998 because the donor has lower tolerance for non-compliance.

It is quite interesting to note that the reforms that the IMF is currently recommending for Russia are the same ones it recommended in the early 1990s. Despite Russia's obvious non-implementation of conditions, it has continued to receive loans over the years. It is therefore difficult to deny that the IMF had political interests in Russia's reform, not just economic ones. M. Camdessus addresses "two overriding issues: whether engagement is better than isolation, and whether there is reason to hope that economic reform will succeed in Russia and other countries facing the same painful transition" (Ibid.). He concludes that engagement is better than isolation.

If, as our model suggests, Russia's awareness of the IMF's political motives may have reduced its compliance with policy conditions thereby further retarding structural adjustment, then perhaps it is precisely *engagement* that contributed to Russia's economic problems.

2.5 Limitations and Extensions

There are a number of limitations to our model in 2.3.

Firstly, there may be other important factors in the conditional development process that would influence the payoffs that accrue to the recipient and/ or donor. For instance, the recipient may benefit *positively* from inflows of private foreign

investment when it complies with IMF conditions (for example, Marchesi (1999) and Marchesi and Thomas (1999)). Thus instead of always choosing the lowest possible level of compliance which guarantees it future loans, the recipient might undertake more compliance to ensure more private foreign investment.

Secondly, the model does not take into account the economic costs which may arise from implementing policies. It considers only economic benefit (loans) and political costs. The economic costs could be even more severe if reforms are poorly designed: there was much criticism of the suitability of the IMF's reform programme for Russia with Jeffrey Sachs being one of the IMF's most vocal critics. However it can be assumed that the more inappropriate the policies the more difficult will be the complete implementation of the policies and this will lead to a lower level of compliance.

And finally, the model does not draw a distinction between slippage due to lack of government desire, and slippage due to lack of government capacity. This is an important consideration as the model has assumed that the government has a *choice* over its level of compliance/ slippage.

While we consider empirical evidence from Russia as an analytical narrative, more empirical work can be undertaken of a cross section of countries, and/ or over a period of time in one country, to try to determine statistical values for the differences in the IMF's tolerance for policy slippages.

2.6 Conclusion

In this chapter we model a game between a recipient and a lender and discuss how the recipient government may avoid full implementation of conditions without jeopardising future loans by playing a strategic game with the donor.

We suggest that the recipient is, in fact, aware that the donor is motivated not just by *economic* considerations but by its own *political* interests in the conditional development lending process, and that these political incentives are a factor in determining the donor's degree of *tolerance* of non- compliance with economic reform programmes. Thus there ensues a game in which the recipient, aware that the donor has political motivations, attempts to undertake the least level of compliance that guarantees it future loans, and the donor adopts a punishment strategy consistent with its own political and economic motivations.

We model the game between the recipient and donor in section 2.3, in which the recipient chooses its level of compliance with policy conditions and the donor decides whether or not to extend further financing. We solve for the subgame perfect Nash equilibrium by backwards induction. This yields many lending-compliance equilibria depending on the values of the parameters in the payoff functions.

With so many lending-compliance options, and because it faces internal conflict in determining its lending options, we propose that a lender may attempt to create rules under which lending decisions are made to regulate the internal conflict and to provide a framework within which policy is made. These rules are decided in an exogenous conflict between politics and economics that takes place within the donor agency as to the circumstances under which punishment levied. This conflict, *in effect*, determines the donor's degree of tolerance for policy slippages. The rules which arise from the intra-donor conflict, while permitting some discretion over which transgressions to punish, help to regulate the internal conflict by providing a framework of action within which to work. The rules of thumb help fix the value of π in relation to δ.

We suggest three main types of rules that arise from the politics-economics split within the donor agency. The subgame perfect Nash equilibrium for each type of rule is solved by backward induction.

With Rule 1, *No Re-lending,* no level of compliance is sufficient to ensure further financing. The equilibrium for this rule is *default, withhold.* That is, the lender will always choose to withhold further finance and the recipient will always choose to default.

With Rule 2, *Reward only full compliance,* the lender has no tolerance for policy slippages, and will punish any deviation from a full compliance strategy on the part of the recipient. A donor that acts like this may be adopting a particularly strict political stance with respect to this country, perhaps because it is not co-operating on key international political/ human rights agreements. If the donor has a "reward only full compliance" rule, then the recipient will choose to be fully compliant if the value of discounted future loans are of greater benefit to it than the immediate political benefits of non-compliance, and will choose to be non-compliant if not. If the recipient is fully compliant, the donor will offer further finance. If the recipient is non-compliant, the donor will withhold further finance.

With Rule 3, *Leniency*, the donor has tolerance for policy slippages depending on the circumstances of the recipient country. Unlike with Rules (1) and (2), there is the possibility (γ) of receiving further finance for non-compliance. We find that if the donor punishes recipients who implement less than 100% of the conditions attached to the loan with a probability of γ, then the recipient will choose to fully comply with conditions as long as value of discounted future loans exceeds the immediate political gain from policy slippage. If the gain from policy slippage exceeds the cost associated with the loss of further finance, the recipient will be non-

compliant. The recipient's choice of compliance level depends on the discount rate attached to the future loan, the political costs of compliance, and on the probability of punishment.

Our model differs from existing theories in explicitly allowing the lender and recipient to face a trade-off between political and economic interests within its organisation which affect the degree of slippage or the tolerance of policy slippages. Furthermore, the adoption of "rules of thumb" allow the donor to behave differently to two countries that implement the *same* proportion of required conditions, or to one country which implements the same proportion of required conditions over two different time periods.

In Section 2.4 we discuss how the game between Russia and the IMF has elements of the game modelled in Section 2.3. In particular, we propose that from 1992-1998 the game between the two players had elements of Rule 3 (*Leniency*) where the probability of punishment was very low. From August 18th 1998 till the end of September 1999, the rules of the game seemed to change with the IMF adopting a hard line stance with regards to the last tranche of a loan. This "game" corresponded to elements of Rule 2 (*Reward only full compliance*). Then, in response to allegations of money laundering, the IMF suspended all payments to the Russian authorities between the end of September 1999 and December 31st 1999, which corresponds to Rule 1 (*No re-lending*). President Yeltsin's resignation on December 31st 1999 brought about a major shift in some of the parameters of the recipient's and donor's utility functions in our models, and consequently to the 'rules of thumb' under which the IMF operated with respect to Russia. Vladimir Putin, favoured by the West, became the next President of Russia.

Since the year 2000, we propose that the game has again reverted to the one that takes place under Rule 3, but with a higher probability of punishment for non-compliance.

Chapter 3

Fiscal Policy in an Economy with a Corrupt Bureaucracy and a Shadow Economy

3.1 Introduction

This chapter analyses the contribution of fiscal policy to Russia's relatively poor economic performance since it began market reforms in 1992. In particular we focus on the consequences for employment, output and taxation revenues of fiscal policy-induced changes in bureaucratic corruption in an economy with a large shadow economy.

Corruption is widely cited and researched as one of the reasons why firms and workers operate in the underground economy (Kaufmann (1994, 1997); Johnson, Kaufmann and Zoido-Lobatan (1998); Shleifer (1997); Shleifer and Vishny (1993, 1994, 1998)). Firms and workers are discouraged from operating officially in the legitimate private sector because of the rent-seeking predatory behaviour of corrupt public bureaucrats. Corruption is rife in Russia. Transparency International's Corruption Perception Index (2000) estimated Russia's index of corruption as equal to

2.1 (out of a perfect score of 10), ranking it 82nd worst out of 88 countries (see Transparency International's CPI index (2000) for a discussion of methodology, limitations, and problems with the data).

The literature offers three other main reasons why firms may choose to operate underground, none of which are mutually exclusive. High official tax rates and cumbersome official regulations provide disincentives to operate in the legitimate sector (de Soto, 1989). Alternatively, firms and workers may be trying to hide their productive activities to avoid extortion by criminal gangs (Gustafson, 1999). Another reason behind the decision to operate underground is the lack of any advantages of operating legitimately, such as a strong institutional environment that allows the enforcement of property rights and contracts (Marcouiller and Young (1995); Johnson *et al.* (1997)). In Section 4.2 we provide an extensive literature survey of the definitions, causes and consequences of corruption and the shadow economy.

In this chapter we do not contribute *per se* to the debate on the causes of corruption, but rather to the debate on the causes and consequences of *changes* in corruption in an already corrupt bureaucracy. In particular we focus on fiscal policy as a cause of changes in corruption. This allows us to discuss the consequences of some of the fiscal policies adopted by the Russian authorities during its transition to a market economy.

The first policy we consider is reduced public sector spending, in particular the running up of public sector wage arrears because the spending targets of the Russian authorities often exceeded their revenue-raising abilities in 1992-1999. At the end of 1999, wage arrears in the budget-funded sector were equal to 19.4 billion rubles (*Russian Economic Trends*, 1999 (1)). This compares with a budget deficit of 11.5 billion rubles in January 1999 which does not take wage arrears into account. Since

the year 2000, the Russian authorities have concentrated on paying back arrears and have even increased public sector wages which have been eroded by years of high inflation.

The second policy we consider is the policy of high taxes on wages. Indeed, up till the year 2000 progress in tax reform in Russia had been inadequate. The tax system was complex, with up to 200 types of taxes, numerous and sometimes arbitrary exemptions, narrow tax bases, and, partly as a result, high statutory tax rates on labour income. The revenue structure relied heavily on payroll taxes that lead to distortions in the economy. An often stated hypothesis (for example, Schneider 1994) is that the more complex the tax system, the *smaller* the size of the shadow economy (because people cannot work out exactly how much they pay in taxes). The outcomes in Russia and the results of our model contradict this theory.

Our model is based loosely on the work of Frey and Weck (1983) who build a three-sector model comprising a (honest) bureaucracy, shadow sector and legitimate private sector, in which they examine various exogenous actions of bureaucrats. They use a second-order Taylor expansion to approximate the output function. We maintain the basic three-sector structure of Frey and Weck's model as we consider it to be representative of the Russian economy: Russia has a large bureaucracy, a legitimate private sector, and a substantial shadow sector. However we make a number of changes to Frey and Weck's model.

Firstly, we modify a Cobb Douglas output function to include two labour inputs: bureaucratic input and legitimate private sector input. This allows us to separate out not only their respective contributions to output in the economy, but also to analyse variations in legitimate private sector employment separately from bureaucratic employment which is constant in the period in question in the model.

Secondly, we allow the bureaucrats to be corrupt. We model corruption as a proportional tax on the income of legitimate private sector workers. We define the *corruption effect* as the negative impact of an increase in corruption on legitimate private sector employment and output. A crucial assumption we make is that bureaucrats are seeking to maintain a *constant* predetermined wage which is composed of their official and unofficial (corrupt) wage. This stems from a motivation to survive financially (petty corruption), rather than from a motivation to enrich themselves at all costs (grand corruption). Once the bureaucrats have attained enough money to survive on, they restrain their greed. This assumption differs from the standard literature in which the rent-seeking behaviour of bureaucrats stems from their desire for a *higher* wage.

Corruption of state officials is a big problem in Russia, infiltrating all aspects of the Russian economy. Gustafson (1999) sites the following example to show the extent of corruption in Russia. "Where ordinary Russians see it most is on the roads." The traffic police pull you over to the side of the road," says a young trucker, "and you'll stay there for one or two days, because one of your headlights is out. You'll pay a 'lemon' (*limon* - slang for 1 million old rubles, then worth about $160) just to get away.""(p.139).

Thirdly, we model the imperfect tax collection abilities of the government in an economy with widespread tax arrears, tax exemptions, tax deferrals, inter-enterprise arrears and the substantial use of non-monetary means of payment (barter). Total arrears in July 1998 amounted to about 35 percent of GDP (*Russian Economic Trends*, 1999). Gara (2001) reports that banks and non-financial enterprises issued about 27.5 trillion rubles-worth of promissory notes in 1997 (equal to 1.1 per cent of GDP), barter accounted for approximately half of inter-enterprise transactions in

1998, and that in April 2000 only one-third of the overall amount of all transactions were monetised. In addition, taxes to the government have sometimes been "paid in kind" and consequently the government has not been able to use its tax revenue for what it needs to or what it would like to.

Our model has a number of interesting results. Based on our model we suggest that poor economic performance in terms of output and taxation revenues stems in part from a fiscal policy-induced corruption effect. We find that the corruption effect of increased taxation exceeds that of reduced expenditure. However, if reduced spending results in public sector wage arrears then the corruption effect of reduced spending will exceed that of increased taxation. We suggest that if corruption is interpreted as a proportional tax on labour income in the legitimate private sector, then there is a negative association between legitimate private sector employment and corruption. Further research to test the empirical basis of these associations could be undertaken.

The model has implications for a large number of governments of developing and post-communist transition economies who face policy choices in financing their budgets. Furthermore, while lending support to the recent "good governance" policies of the IMF, the model suggests that such policies should be undertaken *before* other structural adjustment policies are recommended/ undertaken. Wolf and Gurgen (2000) discuss the IMF's recent efforts to improve governance in transition countries. The authors suggest that poor governance creates opportunities and incentives for corruption and thus governance must be improved if corruption is to be reduced.

Following on from the policies adopted in Russia, it would appear that an interesting antidote to the corruption problems associated with *public* sector wage arrears was the policy of *private* sector wage arrears by firms and enterprises.

The model and its results raise a number of questions. Firstly, what is the optimal rate of tax in an economy with an unofficial (corruption) tax? Secondly, if a fall in government expenditure is generally perceived to be good in terms of a reduction in the "crowding out" of private investment, is this positive effect cancelled out by an associated increase in corruption? This paper suggests that widening the tax base may be the least distortionary method of improving the budget deficit.

The research in this chapter was motivated by observations of the situation in Russia since the fall of communism and as such I pay particular attention to characterising this relationship. However observation suggests that the analysis is applicable to other transition and developing economies, and hence may be interpreted more generally.

The rest of the chapter is organised as follows. An extensive literature survey of the definitions, causes and consequences of corruption and the shadow economy is given in section 3.2. Section 3.3 discusses Russia's three-sector economy. In section 3.4 we develop the basic model to be used in the analysis. In section 3.5 we analyse the corruption effect of reduced bureaucratic wages, of which public sector wage arrears are an extreme example. In section 3.6 we examine the corruption effect of increased taxation. Section 3.7 compares the results for reduced expenditure and increased taxation. Section 3.8 discusses how the results of our model hold up in the Russian context. Section 3.9 examines the limitations to, and possible extensions of, our model. Section 3.10 concludes.

3.2 Review of the Literature on the Shadow Economy and Corruption

3.2.1 The Shadow Economy

Definition of the Shadow Economy

Studies of the "shadow economy" which have been undertaken by economists, sociologists, political scientists, historians, social anthropologists (to name but a few) have resulted in a wide array of terms used to describe shadow sector activities. Synonyms for the shadow economy include the hidden, black, informal, unofficial, second, subterranean, parallel, clandestine and underground economy.

We define the shadow economy as the "unrecorded value by any deliberate misreporting or evasion by a firm or individual" (this is taken from Kaufmann and Kaliberda, 1996). This definition covers untaxed incomes and unrecorded capital flight. However different authors use different terms to describe shadow activities depending on the type of activity or income they are concentrating on.

Thomas (1992) classifies shadow sector activities into four main sectors of production. The *Household Sector* is involved in the production and consumption of goods and services which are usually left out of national income accounts because they are difficult to measure with any degree of accuracy. Examples of such activities include the unpaid labour of housewives. The *Informal Sector* involves small-scale production of goods and services which are traded to consumers or to other producers. The production of these goods and services is not illegal but not usually included in national accounts because of the difficulties and expense involved in collecting such data. The *Irregular Sector* involves the production of legal goods and services, but illegal means are employed to facilitate production (such as the avoidance of

legislation) or to keep production secret from the authorities (such as tax evasion and social security fraud). The *Criminal Sector* involves the production and consumption of illegal goods and services. Activities such as theft and extortion are included in the criminal sector.

While Thomas (1992) distinguishes between the different types of activities in the shadow sector, Feige (1989) concentrates on the *incomes* from such activities. He constructs a simple taxonomic framework for total economic income in which he distinguishes between income generated in the shadow economy and income generated in the non-shadow economy. The table below illustrates this framework.

Table 3.1: Taxonomic framework for economic income

	Total Economic Income			
Market Classification	Market Income		Non-Market Income	
Legal Status Activity	Illegal Activity	Legal Activity	Legal Activity	Illegal Activity
Reporting Status	Unrecorded Income	Recorded Income	Imputed Income	Unrecorded Income
National Income and Product Accounts	**Monetary unobserved sector**	**Estimated gross national product**		**Non-monetary unobserved sector**

The shadow economy includes unrecorded income from both legal and illegal productive activities, and involves monetary and non-monetary transactions (barter).

The growth of the shadow economy is of great concern to policymakers for a number of reasons including:

(i) A decrease in tax receipts and an erosion of the tax base (which leads to rising budget deficits). This is particularly the case when the size of the shadow economy depends to a large extent on the overall burden of taxation and regulation

(ii) "Policy illusion" - the process whereby policymakers react to observed economic activity without regard for the unrecorded sector. This may lead to erroneous policy

choices. McGee and Feige (1989) incorporate the unrecorded sector into existing macro-models to examine the consequences of policy reactions to misinformation.

Theoretical Analysis of the Shadow Economy

The shadow economy has received much attention over the years both theoretically and empirically. Theoretical attention on the activities of the shadow economy has focused mainly on tax evasion as a motive for operating in the shadow economy. However avoiding the direct and indirect burden of taxation is not the only factor influencing the shadow economy. Other factors include the burden of regulation, the complexity/ visibility of the tax system, the official labour market, and public sector services and social transfers.

(i) Tax Evasion

Microeconomic Studies

Allingham and Sandmo (1972) present one of the first microeconomic models of tax evasion. They show that under certain assumptions individuals will declare more of their income as their pre-tax incomes grow, and that an increase in tax rates will lead to an increase in tax evasion. Other researchers such as Yitzhaki (1974) have relaxed the assumptions of the Allingham and Sandmo model and have come up with an array of differing results.

Isachsen and Strom (1980) developed a model containing a regular and irregular sector. Their results show that an increase in the probability of detection reduced regular sector activity, while a rise in the tax rate or the irregular sector wage led to a change in the distribution of labour between the two sectors.

Sandmo (1981) incorporates tax evasion into the analysis of optimum income taxation. Labour supply is distributed between a regular and irregular sector. Given

taxpayer behaviour, the government chooses tax rates, penalties and the probability of detection to maximise a utilitarian social welfare function. A formula for the optimum marginal rate of taxation is derived. The author characterises the factors which determine the choice between the penalty rate and the probability of detection as instruments for the control of tax evasion. Hansson (1987) develops a simulation model to determine the optimal rate of income tax when untaxed production is taken into account. The traditional model with no untaxed production is taken to be a special case. A comparison of the optimal tax rates in the two cases shows the potential bias in the traditional analysis.

Macroeconomic Studies

Theoretical attention on the macroeconomics of tax evasion has focused on the possible disincentive effects of taxation associated with the Laffer curve. Waud (1986) analysed the effects of tax evasion on the Laffer curve by introducing a tax aversion function into a simple supply-side macroeconomic model thereby allowing for *both* tax avoidance and tax evasion. Hansson (1987) provides a theoretical analysis of the effects of the irregular sector on optimal income tax rates in the Swedish economy.

Some studies have examined the effects of tax evasion by introducing the irregular sector into a macroeconomic model. Peacock and Shaw (1982) use a simple fiscal policy model to measure the extent of tax evasion and to study the implications for equity and stabilisation objectives. Ricketts (1984) uses a simple IS-LM model (building on the model of Peacock and Shaw) to examine the effects of an irregular sector on both the IS curve and the LM curve. Lai and Chang (1988) incorporate the effect of tax evasion on labour supply into the Peacock and Shaw model. They show

that an increase in the degree of tax evasion may increase total tax revenue rather than reduce it.

(ii) Complexity/ Visibility of the Tax system

Schneider (1994) discusses how the complexity/visibility of the tax system contributes to shadow economy activities. He states (an often stated hypothesis) that the more complex/ less visible the tax system the lower the size of the shadow economy (and vice versa).

(iii) Avoiding Bureaucracy and Regulations

While tax evasion is one of the motives for operating in the shadow economy, it is not the only one. Avoiding bureaucracy, especially in countries where economic activity is highly regulated, is another motive for operating in the shadow economy. There has been little macroeconomic modelling of this phenomenon.

Frey and Weck (1983) present a three-sector model with a public sector, a private legitimate economy, and a shadow economy. They analyse various exogenous actions by the bureaucracy, such as an increase in the tax rate and an increase in the number of bureaucrats, and the resulting reactions of taxpayers. They find that an increase in the tax rate reduces employment in the legitimate private sector and increases employment in the shadow economy. An increase in the number of bureaucrats (where the wage rate remains the same) will be accompanied by an increase in the tax rate to fund the extra public employment. If the tax rate remains below the optimal rate of tax, there will be a decrease in legitimate private sector employment. Employment in the shadow may increase overall, depending on how much employment increases as a result of an increase in the burden of taxation and on how many workers are attracted to the new employment in the public sector.

However, Frey and Weck do not consider the implications of a *corrupt* bureaucracy on their results.

An increase in the *intensity* of regulations governing the official sector (for example, reduced working hours) may lead to an increase in shadow sector activity. Regulations increase labour costs of employers and these costs are often passed on to employees who choose to work in the shadow economy to avoid these regulations.

Johnson, Kaufmann and Shleifer (1997) develop a model which suggests that, in general, countries with a higher level of regulation of their economies tend to have bigger shadow economies.[1] Empirical support for this hypothesis is given by Johnson, Kaufman and Zoido-Lobaton (1998b) and by Friedman, Johnson, Kaufman, and Zoido-Lobaton (1999). These studies lend support to the theory that it is the enforcement of regulation that is important in driving firms underground - not the overall extent of regulation (where unenforced). Policy recommendations suggest that governments should concentrate on improving the enforcement of laws and regulations rather than just increasing their number. Some governments prefer to increase the number of laws and regulations as a means of controlling the shadow economy, as this increases employment in the public sector and further increases the power of the bureaucrats.

(iv) Official Sector Labour Market

In addition to the disincentive effects of the intensity of regulations governing the official sector, there are a number of other characteristics of the official sector labour market that have been found to influence the decision to operate in the shadow

[1] Johnson, Kaufmann, and Zoid0-Lobaton (1998b) undertake empirical analysis of this model. Their results show that a one point increase of the regulation index results in an 8.1% increase in the size of the shadow economy.

economy. These include the net wage in official sector, total wage costs, and the unemployment rate.

Lemieux, Fortin, and Frechette (1994) analyse microdata from Canada and their results suggest that changes in the net wage in the official sector do influence the number of hours worked in the shadow economy. They find that there is a large negative elasticity of hours worked in the shadow economy with respect to the net wage rate in the official sector, and that there is a high degree of labour mobility between these two sectors.

Total wage costs also offer an incentive for firms/ individuals to operate underground. This is especially the case in developed countries where unemployment is thought to be related to very high labour costs.

The policy of reducing working hours to reduce unemployment (for example by labour unions in France/ Canada) may provide an incentive for labour to increase in the shadow sector as people have more time on their hands to do "cash-in-hand" jobs. Early retirement/ part-time jobs also provide people with opportunities to undertake employment in the shadow economy where their wages are untaxed.

(v) Public Sector Services and Social Transfers

Poor provision of public sector goods and services (such as public infrastructure) and social transfers (such as pensions and unemployment benefit) create incentives for firms/ individuals to operate in the shadow economy. Often a vicious cycle occurs in which poor provision of public goods and services leads to an increase in shadow sector activity which leads to a decrease in taxation revenues (and a further decrease in public provision), an increase in tax rates and a further increase in the shadow economy.

Effect of Shadow Economy on the Official Economy

A growing shadow economy reduces taxation revenues resulting in both a lower quality and lower quantity of public goods and services. Loayza (1996) develops an endogenous growth model with congestable public services. The model finds that in economies where (i) the enforcement of compliance is weak and where (ii) the tax burden is larger than the optimal tax burden, increases in the relative size of the shadow economy results in a fall in economic growth. This model has been widely criticised for unrealistic assumptions.

Schneider and Enste (2000) report that figures produced in Schneider (1998) show that 66% of income earned in the shadow economy is immediately spent in the official economy which positively stimulates the official economy. Bhattacharyya (1990), estimating an econometric model for UK consumer expenditures from 1960-84, finds that the shadow economy has a significant positive effect on consumer expenditures (especially durable goods and services).

Adam and Ginsburgh (1985) build a small macroeconomic model containing an irregular sector. They examine how policies intended to increase employment and output can conflict with policies designed to discourage irregular sector activity. They show that Keynesian multipliers may be lowered by as much as 40% in some cases even though the irregular sector only represents 10-15% of total economic activity. However they also find, under certain circumstances, a positive relationship between the growth of the shadow economy and the official sector. Expansionary fiscal policy positively stimulates both the official and irregular sectors.

McGee and Feige (1989) incorporate the unrecorded sector into existing macro-models to examine the consequences of policy reactions to misinformation. They show that distorted information can greatly affect the stability of the economic

system. When full employment is the target for monetary policy distorted information can cause accelerating stagflation. When price stability is the target for monetary policy, with fiscal policy relying on automatic stabilisers, distorted information may lead to higher interest rates and budget deficits. The authors suggest that "the predicted consequences of such distortions are broadly consistent with what we increasingly observe in our present-day economies" (p.98).

Empirical Analysis of the Shadow Economy

There are three main types of information available to empirical researchers of the shadow economy. The first is anecdotal evidence which is useful as a qualitative guide to understanding the underground economy, but not useful as a quantitative guide. The second is microdata collected from sources such as surveys, tax audits, and unemployment records. The third is macroeconomic data from published data sources.

A variety of methods are employed by researchers to estimate various aspects of the underground economy. With various definitions and methods of quantifying the shadow economy, what is (and needs to be) measured is often a bone of contention. The June 1999 edition of the *Economic Journal* included a collection of papers by Tanzi, Bhattacharyya, Feinstein, Giles, and Thomas discussing the controversy surrounding the measurement of the hidden economy: Thomas criticises the various methods of estimating the hidden economy. He says " measurement without theory is a fair description of the published empirical work aimed at guestimating the size of the 'hidden' or 'black' economy.....a mere guestimate of the overall size of the black economy is of limited value for the policy maker; it is also important to know who is doing what, where, how and why" (p. F381). He goes on to

suggest that with "the various attempts to measure the size of the black economy, one should be aware of a political dimension to some of this work.....If a large part of the black economy is social security fraud, then maybe unemployment is not really as bad as it looks? Clearly such political conclusions depended on having good theoretical as well as sound quantitative foundations and both of these components were generally missing" (p.F381).

(i) Microeconomic Analysis

Economists who undertake empirical microeconomic studies usually concentrate sample surveys which have been carried out to collect information relevant to the shadow economy. Three types of such sample surveys are tax audits, labour market surveys, and household surveys.

Frey and Pommerehne (1982) discuss the use of tax auditing methods to estimate the size of the underground economy. They report that the extent to which tax auditing is used differs considerably among countries. In the United States the General Accounting Office (GAO 1979) attempted to estimate the number of nonfilers of Federal income tax using a representative sample of 50,000 households. It estimated that there were between 4.1 and 5.3 million nonfilers in 1972, compared with the Inland Revenue Service (IRS) estimate of 0.6 million nonfilers for that year. While tax auditing methods are useful for gaining detailed information about income groups, it tends to underestimate the exact size of the underground economy because respondents are usually unwilling to admit the true extent of their tax evasion. In addition the estimates are easily altered by changes in detection methods/ questionnaire design.

The shadow economy may reveal itself through low labour force participation rates in formal labour markets. The difference between the official and "actual"

participation rates allows t he size of the shadow labour force to be estimated. Frey and Pommerehne (1982) suggest that according to OECD statistics reported in Fua (1976) the official participation rate in Italy in 1975 was only 35.5% compared to 46.4% in the United Kingdom and 48% in Japan. The underground labour force can also be estimated by interviewing a sample of the population asking whether they are buyers or sellers of underground labour services. In a study undertaken by Isachsen, Klovland, and Strøm (1981) people were more willing to admit that they had bought underground labour services (29%) than to admit they had sold such services (20%). Data on labour force participation rates are likely to underestimate the size of the underground labour force due to the narrow focus of such data.

Household surveys can be used to derive information on discrepancies in income-expenditure of private households and extrapolated (if the sample is representative) to give an estimate of the whole shadow economy. Frey and Pommerehne report that O'Higgins (1980) calculates expenditure-income discrepancies for specific types of households, occupational groups and income classes and compares them to disaggregated unexplained residuals in the macro level. O'Higgins suggests that in 1978 in the United Kingdom private households headed by self-employed people failed to report about £2.10 billion. This compares favourably with the estimate by the Central Statistical Office of £2.15 billion.

(ii) Macroeconomic Analysis

Macroempirical estimation of the underground economy has the advantage of using published data sources that have been collected for reasons other than the study of the underground economy. However these methods require explicit assumptions to produce estimates of the underground economy and as such the reliability of any method rests on the reasonableness of the assumptions underlying the estimation

procedure. Many approaches have been adopted to estimate the size of the underground economy and in general these can be put into the following groups.

Discrepancy Methods

These involve estimating the size of the underground economy by examining the difference between estimates of national income and national expenditure. Frey and Pommerehne (1982) use this method to calculate estimates of the underground economy for a number of countries. Estimates varied between 1 and 23.3% of GDP. For example the estimate for the UK in 1978 was between 2.5-3%, while the estimate for France in 1965 was 23%. There are a number of criticisms of this approach. Firstly, estimates of national expenditure are not always larger than estimates of national income. Thomas (1999) suggests that in Switzerland national income estimates tended to be larger than national expenditure estimates, implying a *negative* shadow economy! Secondly, estimates of national income and expenditure are not always constructed in a statistically independent manner. Often the same components are included in both estimates.

Cash-Deposit Methods

These methods assume that cash is the main medium for transactions in the underground economy. If the velocity of circulation of money and the level of deposits remain constant, a rise in underground activity will be reflected in a rise in the cash-deposit ratio. Cagan (1958) and Gutmann (1977) are widely credited for pioneering this approach. This method has a number of restrictive and possibly questionable assumptions. Firstly, transactions in the shadow economy as assumed to be carried out only in cash. Secondly, the velocity of circulation of cash is assumed to be the same in both the shadow and non-shadow sectors. And thirdly, a specific year

or period has to be identified as the starting point at which the economy had no shadow sector. The third assumption is extremely questionable as shadow activity has been recorded for many centuries. As Thomas (1999) aptly puts it "Was there ever a year in any society when hidden economic activities were not being undertaken? Perhaps in the Garden of Eden, but even there we do not know what else the Serpent got up to!" (p. F383).

Transactions Approach

Feige (1979) proposed that cheques as well as cash are used in the underground economy in the United States. He proposed that the size of the underground economy could be estimated using the transactions method which is based on Fisher's (1911) equation of exchange in which the total volume of payments (MV) is equal to the total volume of transactions (PT).

The transactions approach is similar to the cash-deposit approach. and as such is open to all the criticisms of that approach. It does have the advantage of being less restrictive than the cash-deposit method by relaxing the cash only assumption.[2] The transactions approach makes the critical assumption of a stable and proportional relationship between total income and total transactions. This method requires a large amount of data for empirical estimation and this limits its widespread use.

Regression Models

Multiple regression models have been developed to try to estimate the size of the shadow economy. Tanzi (1983) was one of the first pioneers of this method to estimate the size of the shadow economy. Regression analysis has the advantage over the first two approaches of allowing for effects other than changes in the shadow

sector on cash holdings. In addition it does not require the restrictive assumption of a specific year or period in which the shadow sector does not exist. However regression modelling is not based on sound economic theory, and may suffer from a missing variable problem. Other researchers who have used regression modelling for this purpose include Matthews (1983), Matthews and Rastogi (1985), and Schneider (1997).

Bhattacharyya (1990) uses regression analysis to incorporate the shadow sector's financial requirements into a demand for money equation. He estimates the size of the shadow sector through a reinterpretation of the quadratic and higher power terms used in Ramsey's RESET test of functional form mis-specification. Although this method has the potential for properly testing theories of tax evasion he makes the assumption that there is no functional mis-specification of the demand for currency in the non-shadow economy and that any mis-specification in that equation is due to the exclusion of the shadow sector. In addition the shadow economy variable which the model is supposed to explain is exogenous, and as such the method cannot explain any links between the shadow economy and its economic causes. Thomas (1992 and 1997) provides a comprehensive discussion and critique of this method.

Schneider and Enste (2000) provide a comprehensive survey of the estimates of the size of the shadow economy in 76 different countries using different methods of estimation. They find that the growth of the shadow economy is increasing in all 76 countries, and that this growth is strongly related to increasing burdens of taxation and social security contributions, as well as to the extent of state regulatory activities. In addition rising corruption also has a positive impact on the growth of the shadow economy.

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[2] However this leads to much higher estimates of the underground economy than any other method because of the use of a broader definition of money. This produces larger multiplier effects.

3.2.2 Corruption

The Definition of Corruption

It is important to differentiate between politically motivated corruption and economically motivated corruption. The former is undertaken to obtain some degree of political power while the latter is undertaken to obtain financial wealth. Most of the time the motivations for corruption are a mixture of politics and economics but we will concentrate on the latter with respect to public officials.

Shleifer and Vishny (1993) define corruption as "the sale by government officials of government property for personal gain" (p. 599). This definition however excludes the possibility of corrupt government officials obtaining money for their services as well as money from the sale of government property. Andvig and Moene (1990) present a more comprehensive definition by suggesting that " a member of a public organization acts in a corrupt way if he directly or indirectly deals with a non-member and uses the organization's resources including his decision making power special information to acquire payment that is against the rules of the organization or against the law" (p.64).

Similarities are often drawn between shadow sector activity and corrupt activity and there are often discussions as to whether these two types of activity are actually the same. Fiorentini and Zamagni (1999a) refute this and suggest that a "relevant difference between corruption in legal settings and trading in illegal markets is that the latter one often observes a relatively large number of suppliers, while the former is characterized by a monopolistic supply. This is because illegal markets display low barriers to entry and exit while corruption takes place when there is a public monopoly of supply with large rents which cannot be appropriated by the legitimate government due to informational asymmetries favouring the bureaucrats.

For instance, licences, permits, tax benefits and services capable of spurring corruption are strictly rationed; therefore those who allocate them can extract most of the rents accruing to the purchasers. " (p.xvi).

Fiorentini and Zamagni (1999a) however admit that their definition might not be completely accurate. They suggest that the "most recent literature on the economics of organized crime casts serious doubts over the fact that illegal markets are contestable. This is due to the fact that organized crime tries to impose its taxes through entry barriers, that is by requiring firms to pay a licence to operate through price regulation (imposing the purchase of over-priced inputs), and quotas which restrict output with the aim of increasing equilibrium profits. .....such regulations are typically designed to take into account the interests of the firms active under the protection of the organized crime, providing them with effective barriers against new competitors and from police intervention." (p.xvi).

Theoretical Analysis of Corruption

Corruption is a problem everywhere, not just in Russia. Corruption has many components including bribery, nepotism, fraud, the use of "speed money" to speed up bureaucratic processes, and embezzlement.

(i) Corruption: Type, Causes, Consequences and Cures

Corruption: type and degree

Corruption varies in degree and kind from place to place, and not all varieties of corruption are equally harmful. Klitgaard (1998) distinguishes between three types of corruption. The first is corruption that harms economic and political development by undercutting established rules (such as property rights, the justice system, and the

banking system). The second is corruption that is environmentally or socially destructive. This includes allowing widespread pollution of the environment or extorting high levels of payment from patients in hospitals. The third type of corruption involves paying money to get through bureaucratic regulations or queues more quickly, or irregularities in campaign financing.

Mauro (1998) distinguishes between well-organised corruption and chaotic corruption. The former involves a system of corruption whereby private individuals know whom they need to bribe and how much they need to bribe to obtain particular goods or services. Chaotic corruption, on the other hand, involves a system of corruption in which private individuals need to pay several bribes to different bureaucrats at different stages to obtain a particular good or service, with no guarantee that they will actually get the good at the end of the bribing process.

Shleifer and Vishny (1993) show that well-organised corruption is less harmful than chaotic corruption, especially where the government has a monopoly on the supply of the good (such as licences, permits and passports). They suggest that in situations in which a buyer requires several complementary goods to conduct business, well-organised corruption involves joint profit maximisation by the different government agencies, while chaotic corruption involves independent profit maximisation by the different government agencies. The joint monopolist agency sets the price p_1 (including bribe) at which

$$MR_1 + MR_2 \frac{\partial x_2}{\partial x_1} = MC_1$$

where:

p_1 is the cum bribe price of government good 1

p_2 is the cum bribe price of government good 2

x_1 is the quantity sold of government good 1

x_2 is the quantity sold of government good 2

MC_1 is the official price of good 1 and is the monopolist's marginal cost

MC_2 is the official price of good 2 and is the monopolist's marginal cost

MR_1 denotes the marginal revenue from the sale of good 1

MR_2 denotes the marginal revenue from the sale of good 2

Thus $\frac{\partial x_1}{\partial x_2} > 0$ when the two goods are complements (as is often the case with different government permits for the same project). At the optimum, $MR_1 < MC_1$. The joint monopolist keeps the bribe on good 1 down to expand the demand for good 2. This raises its profits from good 2. For the same reason the monopolist agency keeps the price of good 2 down.

Suppose instead that the two goods are allocated by independent monopolist agencies and each agency takes the output of the other agency as given. Thus, $\frac{\partial x_1}{\partial x_2} = 0$. At the optimum, $MR_1 = MC_1$. The level of bribes (per unit bribes) are higher under independent monopolists than under joint monopolists. Output is lower in the former case. However total bribes collected are higher under joint monopolists since independent monopolists drive the quantity sold so far down that the total revenues from corruption fall. Shleifer and Vishny suggest that well-organised corruption existed in Communist Russia where bribes were channelled through local communist offices and any deviation from the agreed bribe was easily detected and heavily punished.

Chaotic corruption now exists in post-Communist Russia where "the sellers of the complementary government goods, such as permits and licenses, act

independently. Different ministries, agencies, and levels of local government all set their own bribes independently in an attempt to maximise their own revenue, rather than the combined revenue of all the bribe collectors. In Russia in 1991, for example, getting a business started often required bribing the local legislature, the central ministry, the local executive branch, the fire authorities, the water authorities, etc.....The army and police also often demand a cut for protection - another needed government input." (Shleifer and Vishny, p.605). The authors go on to suggest that the central government is too weak to fire or penalise corrupt officials.

The *extent* of corruption is also important. Most economic systems have some degree of corruption, and some authors suggest that corruption can be efficiency enhancing in a society with a high degree of regulatory burden. However where corruption is the norm rather than the exception, the effects are widespread and devastating and the control/ reduction of corruption becomes virtually impossible.

Costs of corruption

It has been argued that there are both positive and negative costs/ effects of corruption. The negative costs include the following.

Bribery increases the costs of transactions and creates a climate of uncertainty in the economy. Bribery acts as a type of tax on enterprises - a regressive tax that falls more heavily on small-scale trade and service enterprises. This has distributional consequences for the economy. In particular it pushes firms underground (outside the formal sector), thereby undercutting the state's ability to raise revenues, and leading to ever-higher tax rates being levied on fewer and fewer taxpayers. This, in turn, reduces the state's ability to provide essential public goods, including the rule of law. A vicious cycle of increasing corruption and underground economic activity can result.

Bribery is economically inefficient as it has a negative impact on long-term foreign and domestic investment, and may stimulate capital flight and 'dollarisation' of the economy as it weakens the banking and credit system. Gustafson (1999) suggests that more capital has flown out of Russia since 1991 than has flown in, amounting to a massive disinvestment in the Russian economy. Mauro (1996) shows that corruption has a negative effect on economic growth. Corruption causes the misallocation of resources as talented agents pursue rent-seeking activities rather than productive economic activity.

Corruption influences government spending priorities, usually favouring "white elephant" projects or large defence contracts, to spending on social schemes such as health, education and civil service pay. Corruption is more distortionary than taxation because of effort must be expended to avoid detection and punishment. Corruption undermines the legitimacy and power of the state.

The positive effects of corruption centre on its role as an efficiency-enhancing system where an economy has a high degree of burdensome regulations. This positive effect is questioned by authors such as Gray and Kaufman (1998).

Sources/ Causes of Corruption

The sources/ causes of corruption are often complexly interwoven. There are both strong motivations for and opportunities to engage in corruption. One (strong) motivation for corruption is the desire to earn an income, particularly where poverty and low civil service salaries are rife. Another motivation for corruption is the lack of insurance, unemployment benefits, and other risk-reducing mechanisms usually available in developed countries. In the event of accidents, unemployment, and illness there is little help available. This creates a climate of uncertainty which fosters/ breeds corruption.

There are a large number of opportunities to engage in corruption, especially in Russia: there are many opportunities for obtaining large economic rents with the privatisation of state-owned properties; officials often have wide-ranging discretion when dealing with private agents and have the power to deny them the provision of government goods and services; there are systematic weaknesses of the state, which are further weakened by unclear rules and regulations which are changed regularly and not widely published or reported; there is excessive government intervention, regulation and discretion in the economy which provides a breeding ground for corruption; there is a lack of government transparency and accountability, and poor financial management serves to create opportunities for corruption, including the use of proceeds from humanitarian aid programs for corrupt purposes; and finally, there is a lack of an effective economic, legal, regulatory and competitive environment for efficient market-based activities which opens up opportunities for corruption.

Tackling corruption

Tackling corruption, especially when it is widespread and pervades all aspects of the economy is extremely difficult. Corruption is caused by political, institutional and economic factors and these underlying causes must be addressed if corruption is to be tackled effectively. A number of economic policy changes will result in a fall in corruption. Reducing taxes/ tariffs and other barriers to international trade, flexible exchange rates, minimising regulations, licensing requirements and other barriers to entry for new enterprises and private (domestic and foreign) investors, reducing subsidies to enterprises, privatisation, and increased transparency, accountability and good financial management.

Government institutions will also require reform. This includes civil service reform, better financial management, tax administration and auditing procedures, and strengthening the legal and judicial systems.

(ii) Corruption: Concept of the State

The literature on corruption can be differentiated according to the concept of the state held by the author(s). There are two main concepts: proprietary theories of the state and welfare maximising theories.

(i) Proprietary theory of the state

These theories assume that public intervention is not designed to solve market failures, but to distribute resources in favour of the ruling class. Fiorentini and Zamagni (1999a) report that "in the presence of inefficient regulation and paternalistic bans on some activities, corruption and illegal trading can be efficiency-enhancing, as they may reduce waiting lists, allocate procurements to low-costs firms and allow for an increase in the total surplus in the case of illegal markets" (p. xxiii).

Researchers suggest that only competition for governmental positions or among different governments can reduce the amount of corruption, forcing governments to introduce less discretionary forms of regulations. Becker (1983) for example, suggests that lobbying between different interest groups can bring about more efficient outcomes.

Policy recommendations stemming from above theory are therefore twofold. Firstly, reduce the scope of direct public intervention and the barriers set up through other regulatory measures. Secondly, legalise illegal markets by deregulation and by reducing controls and constraints on the working of the legal markets. Cheung (1996) surveys different institutional settings in which it is more likely that price regulation

will lead to more bribing. Khan (1996) and Liew (1992) discuss how the social costs of corruption are linked with public intervention.

(ii) Welfare maximising theory of the state

Researchers belonging to this tradition of thought assume that public intervention is an attempt to solve various market failures. They deny that corruption or illegal trading can be efficiency enhancing in the short run, since corrupt bureaucrats tend to "increase waiting lists and manipulate public procurements in order to extract more rents thereby inducing a large dissipation of resources" (Fiorentini and Zamagni, 1999a, p. xxiii). Thus illegal markets can be viewed as a second best policy to improve the allocation of resources. The welfare approach suggests that in the long run both corruption and illegal trading have large negative implications for the economy as a consequence of the emergence of increasing returns in corrupt activities which increase the opportunity costs of investing in productive activities.

Most models which start from the assumption of a welfare maximising theory of the state are characterised by multiple equilibria. Andvig (1991) and Bardhan (1997) provide complete surveys of multiple equilibria models of corruption.

The focus of the research is on finding institutions which are better equipped for reducing corruption and illegal markets. Policy recommendations stemming from above theory depend on whether a static or dynamic framework is adopted.

In static frameworks, normative models are built on the assumption that governments maximise some measure of social welfare. Thus the three main areas of focus are: the compensation for bureaucrats exposed to the risk of being bribed (Mookherjee & Png, 1995), the vertical structure of bureaucratic offices agencies

(Bac (1996), and Cadot (1987)), and the degree of centralisation of public decision making.

In dynamic frameworks, it is extremely difficult to ascertain the consequences of corruption on the investment prospects and long-run growth of a region or a country. Theoretically, there is a negative relationship between corruption and growth. For example see Beenstock (1979).

Bardhan (1997) provides a survey on the literature on corruption.

Empirical Analysis of Corruption

There are few empirical studies based on sound economic theory which investigate the various aspects of corruption.

(i) Microeconomic Analysis

Oldenberg (1987) undertakes a case study of a non-corrupt (at least initially) land consolidation administration scheme in India, and shows how important perceptions about the incidence of corruption may be for the actual incidence of corruption. Wade (1982, 1985, and 1989) studies a specific canal irrigation scheme in the South of India and shows how the efficiency of the administration institution depends on the type of corruption that pervades the institution. Klitgaard (1988) presents several case studies of how anti-corruption campaigns reduce the equilibrium level of corruption

(ii) Macroeconomic Analysis

There are very few macro-empirical studies on corruption. Using the indices of corruption and institutional efficiency provided by Business International, Mauro (1995) finds a significant negative association between the corruption index and the

investment and growth rates. A one-point improvement in the corruption index increases the rate of investment by 3%.

Johnson et al (1998b) find a significant relationship between corruption and GDP growth (an improvement in the corruption index by one point decreases GDP growth by 0.84%), though this relationship becomes insignificant when the shadow economy is included as an independent variable.

3.2.3 Corruption and the Shadow Economy

There is some debate about the relationship between corruption and the shadow economy. One point of view, suggested by Rose-Ackermann (among others), is that shadow economy activities are a *substitute* for corrupt activities. However, this point of view is refuted by a number of authors who suggest that these activities *complement* each other. Johnson et al (1998a, 1998b) and Friedman, Johnson, Kaufmann and Zoido-Lobaton (1999) undertake empirical investigations of the relationship between corruption and the shadow economy. Friedman et al show that a one point increase in the corruption index (that is, corruption has worsened) for a group of countries in 1997 increased the share of the shadow economy by 7.6 %. They conclude that "...In summary, the relationship between the share of the unofficial economy and rule of law (including corruption) is strong and consistent across eight measures provided by six distinct organizations. All eight of the indices suggest that countries with more corruption have a higher share of the unofficial economy" (p.27).

Schneider and Enste (2000) provide a comprehensive survey of the estimates of the size of the shadow economy in 76 different countries using different methods of

estimation. They find that rising corruption has a positive impact on the growth of the shadow economy.

3.3 Russia's Legitimate Private Sector, Shadow Economy and Corrupt Bureaucracy

We examine how the three-sector structure of our model to be developed in section 3.4 is representative of actual observations in Russia in terms of its legitimate private sector, the shadow economy, and corrupt bureaucracy.

The Legitimate Private Sector Labour Market in Russia

Layard and Richter (1997) present an excellent discussion of the adjustment of Russia's labour market to the new capitalist economy. They suggest that Russia's successful labour market adjustment in the first few years of transition was predominantly the result of real wage flexibility. A Russian firm facing a fall in revenue is under far less pressure to maintain the real wage of its workforce than a firm in the United Kingdom. Not only can the firms pay workers less (even to the point of running up wage arrears), but the workers can also be put on short-time hours or involuntary leave. Thus few Russians are pushed out of their jobs. The unemployment rate in 1993 was only 5.3%. This compares favourably with unemployment rates in Poland (15%), in Hungary (12%), and in Slovakia (14%) (*Financial Times*, 29 July 1994, p.11).

Thus in the early stages of transition there appears to have been an implicit contract between firms and employees where employees accepted highly flexible wages and hours in return for job security. Employees were willing to accept these terms for three main reasons.

Firstly firms provide not only the wages of employees but also welfare, housing, and the use of the firm's tools which can be used for second jobs. Secondly, employment is a source of social identity and few people look forward to the prospect of unemployment. Thirdly, unemployment benefits are low.

Firms were also willing to accept these terms for a number of reasons. The first reason is financial. Workers have to be paid high severance payments in the event of redundancy and it makes financial sense for the firms to keep employees on unpaid leave/ short-time hours instead of making them redundant. Secondly firms/ managers feel a strong obligation to workers either for paternalistic reasons or (increasingly) because workers tend to be the majority shareholders in the firms. Privatisation by the voucher system left a large number of former state-owned enterprises in the hands of the workers. Fear of unemployment and a lack of necessary incentives conspire to prevent workers from restructuring. Blanchard (1997) suggests that although restructuring leads to increases in productivity and output, the resulting initial increase in unemployment may increase opposition to restructuring and therefore slow down the economic recovery process.

Unemployment rates remained below the Western European average of 10% until 1997. The table below shows unemployment rates in Russia from 1992.

Table 3.2: Unemployment (annual average, in per cent of labour force)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Unemployment	0.0	4.8	5.3	7.1	8.5	9.6	10.8	11.8	12.7	10.6	9.0

Source: EBRD Transition Report,
Russia Economic Trends

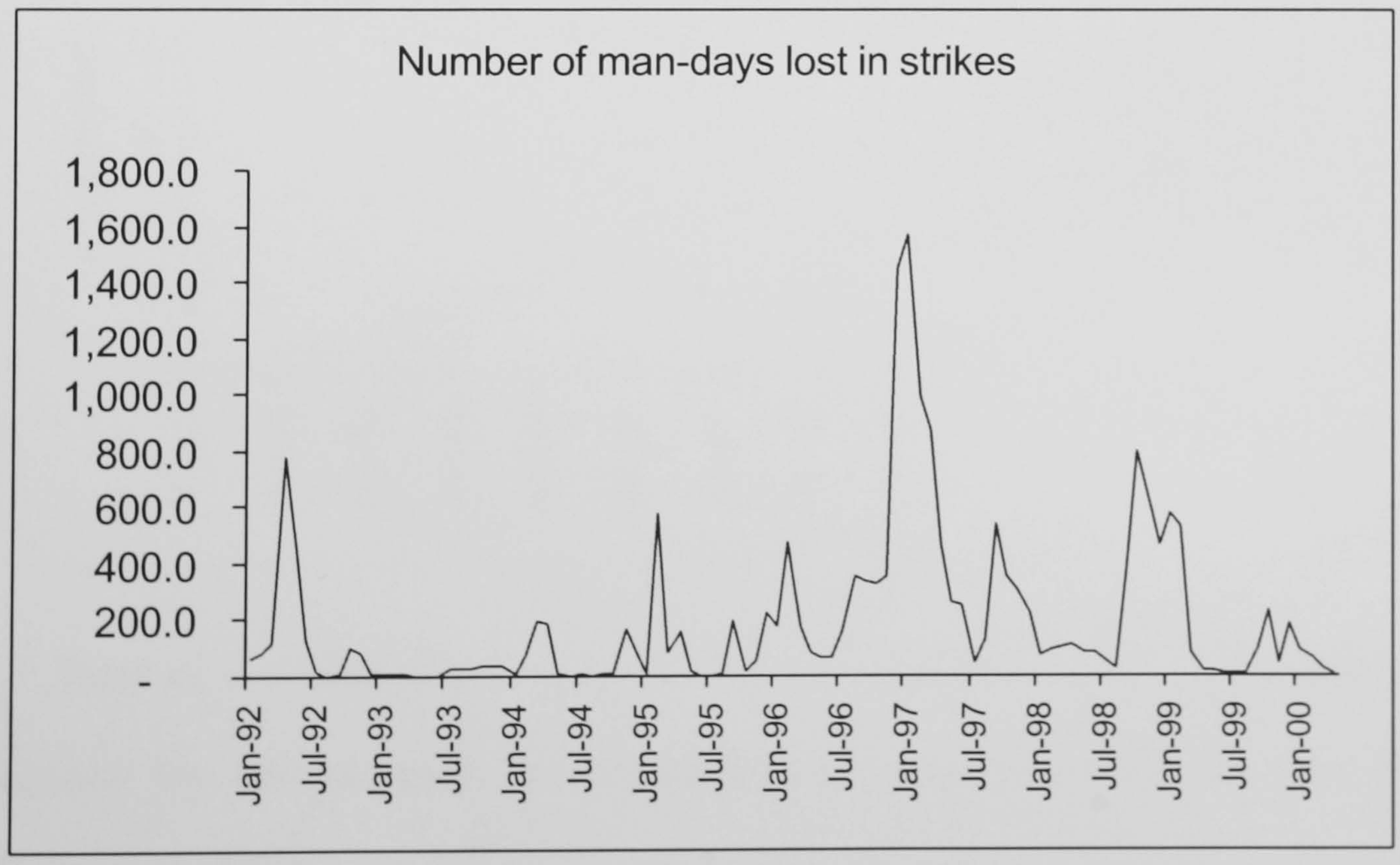
The August 1998 rouble crisis led to a small fall in employment: registered employment at large and medium-sized enterprises fell about 4% from 43.7 million to

42 million (*Russian Economic Trends*, 1999). Immediately after the August crisis, there was a surge in consumer prices that eroded real wages by 35% between August and October. Wage arrears owed by enterprises continued to rise and in 2001 totalled R29.8 billion, although in 2001 they rose more slowly than in previous years. In addition real wages increased by 22.1% in 2001 compared to 19.6% in 2000.

Thus, while unemployment increased in 1999, it declined again in 2000 and 2001 in response to economic growth in Russia, as well as to continued real wage increases and a reduction in wage arrears.

The decline in real wages and continuing growth of wage arrears in the mid 1990s contributed to an increase in strike activity. Strike activity peaked in 1992, 1997, and 1998-99. By the year 2000, the level of strike activity had fallen to near-zero levels. Below is a diagram showing strike activity in the 1990s.

Figure 3.1: Level of strike activity from 1992-2000

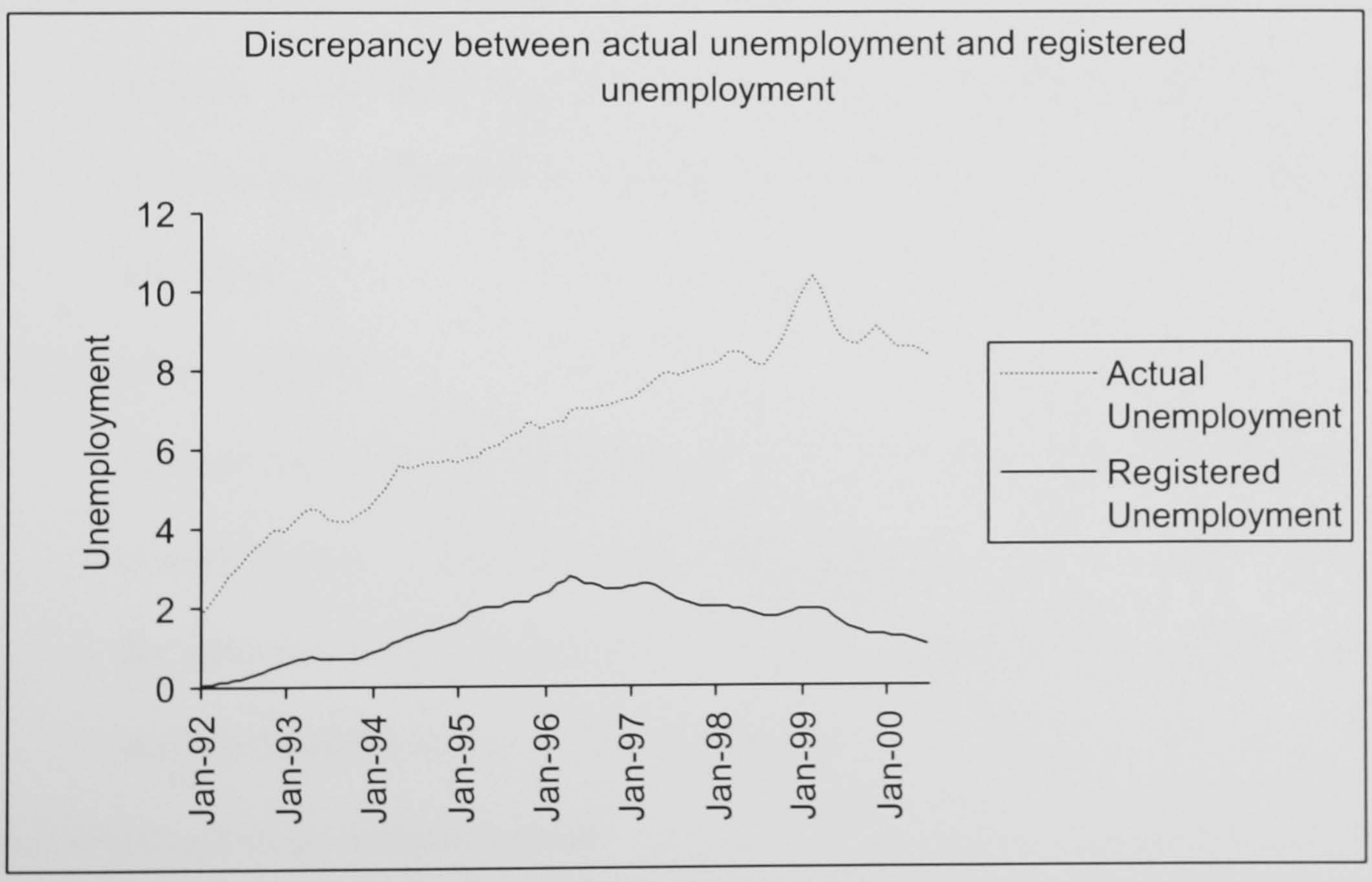


The fall in real wages in 1998 was accompanied by a rise in wage differentiation. By December 1998, real wages in health care and education had fallen to 14-15% of

wages in the finance and insurance industry (compared to 25% in December 1997) (Russian Economic Trends 1999). By January 1999 real wages were down by 38% from a year earlier (Russian Economic Trends, 1999). Wage differentiation across industries continued to grow: by 68% in 2000 and 65% in 2001.

Despite unemployment reaching higher levels in the late 1990s, few bothered to register with the unemployment office. Graph 1 above shows the discrepancy between the number of unemployed workers and the number of registered unemployed. The data are from Russian Economic Trends.

Figure 3.2: Discrepancy between actual unemployment and registered unemployment



There are a number of reasons for the low numbers of the registered unemployed including low unemployment benefits, undeclared earnings, and distance from the Employment Office.

The Shadow Economy

Russia is not a novice when it comes to a shadow economy. The USSR's "second" economy was well established and is well documented.[3] Treml and Alexeev (1994) estimate that in the 1970s the second economy accounted for between 15-18% of total economic activity in the USSR. By the mid-1980s it had grown even larger, and by 1994 it was estimated to account for 40% of GDP (Schneider and Enste, 2000).

Kaufmann and Kaliberda (1996) suggest six main distinct characteristics of the shadow economy in the FSU (former Soviet Union) and CEE (Central and Eastern European Countries). These are:

(i) The coexistence of state and shadow activities and enterprises

Shadow sector activities are often carried out with the knowledge of state officials and are sometimes carried out with/in state assets such as buildings/ enterprises.

(ii) Visibility and size

Shadow activities are sometimes large and visible, although they are not always obvious as they take place within large state enterprises where part of the operation is official and part is unofficial. In addition some shadow sector activities employ the use of high technology.

(iii) Extralegal in an *economic* sense

Shadow sector activities appear to be largely non-violent and non-criminal, and operate "unofficially" to escape regulatory burden and high taxation rates. There is also a criminal mafia, but this organisation appears to have a relatively small share of shadow sector activities.

(iv) Continuum in the official-unofficial activity spectrum

Shadow sector activities vary from operating fully in the official sector to being completely unofficial. In practice most operations take place in both economies.

(v) Social services and state subsidies are accessible to unofficial activities

The legacy of socialism, the existence of state and shadow activities, and the continuum in the official-unofficial spectrum means that almost every activity and individual is within the social security net. Shadow sector activities are expert at extracting resources from the State.

(vi) The shadow economy is "shallow"

Decisions on operating in the official or unofficial economies depend largely on government-induced incentives rather than on well-entrenched operating procedures (such as the criminal Mafia).

A presidential report contradicts Kaufmann and Kaliberda's assertion in (iii) above that the criminal Mafia appears to have a small share of shadow sector activities. The report suggests that 70-80% of all Russian private enterprises and commercial banks pay protection money to criminal gangs, amounting to between 10-20% of their turnover or to about half their profits.[4] Gustafson (1999) reports that almost all small consumer businesses, such as small shops, restaurants, cafes, kiosks, and even private farmers, pay extortion money (p. 137). In addition, of course, the income these criminal gangs obtain through extortion represents a loss of taxation revenue to the government on two counts. First, the businesses which pay extortion

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[3] See for example, Grossman (1977), Katsenelinboigen (1977), O'Hearn (1980), Rumer (1981), Bauer (1983), Feldbrugge (1984), and Grossman and Treml (1987) and references therein.

[4] Gustafson (1999) states that the report was written by Petr Filippov in 1994 when he was serving as an adviser to the President and that the report is summarised in *The New York Times* (January 30 1994).

money have less money left to pay taxes, and will probably under-report profits to take into account the loss of income. Second, criminal gangs obtain a large unreported income which is free of all government taxes.

In addition, corrupt officials, who are seeking to obtain bribes, turn up (often unannounced) and threaten the companies with lengthy bureaucratic or legal procedures regarding the operation of their businesses/ the accuracy of the company (tax) accounts. In fact, the two are often in cahoots with each other. Gustafson suggests that "Organized gangs know whom to shake down and how much to demand, because an army of police officers, bank officials, and undercover agents serve as tipsters .... Extortion is hard to fight because nearly everyone has something to hide. Victims will not report crimes to the police, for fear of revealing their incomes to the tax inspectors or to corrupt officials who will tip off the gangsters. One Russian source estimates that 80% of all robberies and 90% of all frauds are never reported."(p.138).

Schneider and Enste (2000) report a substantial increase in the size of Russia's shadow economy during the transition period: in 1994-95 it amounted to an average of 40% of GDP. The data are shown in the table below.

Table 3.3: The size of Russia's shadow economy using the physical input (electricity) method of estimation (in percent of GDP)

	1990-93 (average)	1994-95 (average)
Estimates from Johnson et al	27	41
Estimates from Lacko	36.9	39.2

Sources: Calculations of Schneider and Enste (2000), using values of Johnson, Kaufmann, and Shleifer (1997, table 1, p.182-83); Johnson, Kaufmann and Zoida-Lobaton (1998a, p.351) and Lacko (1999, table 8)

Kaufmann and Kaliberda (1996) also obtain an estimate for Russia's shadow economy of about 40% using the macroelectric approach.

The Corrupt Bureaucracy

Corruption of state officials is a big problem in Russia, infiltrating all aspects of the Russian economy. Transparency international's Corruption Perception Index (2000) estimated Russia's index of corruption as equal to 2.1 (out of a perfect score of 10), ranking it 82nd worst out of 88 countries.

Gustafson (1999) sites the following example to show the extent of corruption among local officials, police, soldiers, and border guards. "Russian soldiers and border guards play a key role. "If you have enough money," says a Kyrgiz anti-narcotics official, "you can pay Russian border guards to deliver your opium in helicopters.""(p.141).

Another example is one given to me personally by Mark Harrison who has visited Russia on many occasions. "The day after I had been shaken down by police for a couple of hundred rubles, a friend told me that a German journalist had been interviewed on the radio. He had been stopped by the (notoriously corrupt) GAI, the traffic police. He said: "Why did you stop me? I've done nothing wrong." The policeman said: "Why should my wife and children have to wait for you to do something wrong?"".[5]

Goldman (1998) compiled a list of the 12 wealthiest men in Russia who between them control most parts of the economy including oil, media, transport, heavy industry, finance and banking, and computers and electronics. Goldman asserts that in 1988 none of these men had a net worth of more than $10,000. They have grown rich on the back of the transition process. The list includes Anatoly Chubais, the former deputy prime minister, who has also been the President of the electricity monopoly UES. His varied political career included being in charge of the State

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[5] Mark Harrison in personal correspondence, 12 June 2001.

Committee on Privatisation (where he designed and implemented the voucher privatisation of state-owned enterprises), and negotiating loans with the IMF (he convinced the IMF to provide Russia with $22 billion in loans, double the expected amount). In the summer of 1999 Anatoly Chubais was one of the first names on the prosecutor-general Yuri Skuratov's list of Russia's corrupt politicians involved in money laundering. Also on the prosecutor-general's list was Andrei Kozyrev, the former foreign minister. Boris Yeltsin, the ex-President of Russia, and his family, have also been linked to corruption.

In the summer of 1999, the problem of corruption came to a head with the IMF halting loans to Russia until allegations of money laundering had been investigated. In fact, recent IMF policies stress "good governance" as a (pre-) condition of the lending process. Wolf and Gurgen (2000) examine the relationship between governance and corruption in transition economies. Governance is the "manner in which governments discharge their responsibilities" (p.4). Governance covers a wider range of government activities than corruption, and is a broader concept than corruption. Poor governance, he suggests, creates opportunities and incentives for corruption and thus governance must be improved if corruption is to be reduced. Wolf and Gurgen focus on three main areas where governance needs to be improved. Firstly government intervention, regulation and discretion in the economy needs to be reduced. Secondly, government accountability, transparency and financial management need to be enhanced. Thirdly, an effective environment for efficient market-based activities needs to be created. The authors discuss the efforts the IMF is undertaking to improve governance in transition countries.

3.4 The Basic Model

This model comprises three distinct sectors: a bureaucracy, a legitimate private sector, and a shadow economy. The first two are referred to collectively as the legitimate sector (L): the legitimate sector is that part of the private economy which is subject to direct and indirect official taxation. Income in the shadow economy is not liable to taxation. Total output Y of the economy is given by:

$$Y = Y_L + Y_S$$

where Y_L is output from the legitimate sector (registered output) and Y_S is output from the shadow economy. Registered output is given by the modified Cobb Douglas output function:

$$Y_L = \alpha_L Z_B^{\gamma_B} Z_P^{\gamma_P} K^{(1-\gamma_B-\gamma_P)} \qquad (1)$$

where: $\gamma_i \in (0,1)$ *for* $i = B, P$; $\gamma_P \geq \gamma_B$; $\frac{\partial Y_L}{\partial Z_P} > 0, \frac{\partial^2 Y_L}{\partial Z_P^2} < 0$

where Z and K are the labour and capital inputs of production respectively, and labour is divided into the bureaucratic labour input, Z_B, and the legitimate private sector labour input, Z_P. Let Z_B and Z_P denote the number of hours worked in the bureaucracy and private sector.

We assume that while governments fix bureaucratic wages and the number of bureaucrats, the number of workers in the legitimate private sector and the shadow economy is determined by perfect mobility between the sectors. For the purposes of this model, the capital input is normalised to 1.

The legitimate private sector

The gross wage rate (w_P^g) in the legitimate private sector is determined by the marginal productivity of labour. That is,

$$w_P^g = \frac{\partial Y_L}{\partial Z_P} = \alpha_L \gamma_P Z_B^{\gamma_B} Z_P^{(\gamma_P - 1)} \tag{2}$$

And the official net wage (w_P^n) is:

$$w_P^n = (1-\tau) w_P^g \tag{3}$$

where τ is the official tax rate

A worker's take-home-pay is reduced by the amount he has to pay in bribes to public officials for various public goods and services he requires on a day-to-day basis. Chugh and Uppal (1986) characterise bribes as 'private taxation collected by public officials, who wield the effective monopoly power invested in them to issue permits, licences for scarce commodities or import/export licences, etc., for their private gain' (p.71). We assume that corruption acts as a (unofficial) proportional tax (τ_C) on workers. Thus their net unofficial wage is:

$$w_P = (1-\tau-\tau_C) w_P^g \tag{4}$$

The shadow economy

Workers can move in and out of the shadow economy with ease, and wages are not taxed, either officially or unofficially. Output of the shadow sector is given by:

$$Y_S = \alpha_S Z_S^{\gamma_S} K^{(1-\gamma_S)} \tag{5}$$

where: $\gamma_S \in (0,1)$: $\gamma_P + \gamma_B > \gamma_S$; $\alpha_L > \alpha_L$; $\frac{\partial Y_L}{\partial Z_S} > 0, \frac{\partial^2 Y_L}{\partial Z_S^{\,2}} < 0$

where Z_S, and the number of hours worked in the shadow economy. The shadow economy is assumed to produce the same goods as the legitimate private sector but has a different production function. Frey and Weck suggest that the reason for this is that in the shadow economy property rights and contracts are not enforceable by public law. This may result in different information and transactions costs involved in production activities. The gross wage of the shadow sector worker is also given by his marginal productivity. That is:

$$w_S^g = \frac{\partial Y_S}{\partial Z_S} = \alpha_S \gamma_S Z_S^{(\gamma_S - 1)} \tag{6}$$

Although the gross wage is not officially taxed, individuals face a risk δ_S of being detected and punished, and deduct this from their gross wage. Therefore the net wage is given by:

$$w_S = (1 - \delta_S) w_S^g \tag{7}$$

The corrupt public bureaucracy

Market forces do not determine the bureaucrats' *official* wage rate. The government bases the official bureaucratic wage on the tax revenues it *should* receive rather than what it will receive given its weak tax base. Government spending G is only used to pay public employees.

Public bureaucrats also pay income taxes and this is deducted at source. Public bureaucrats are paid a pre-determined after-tax official wage of:

$$G = (1 - \tau) w_B^g Z_B$$

$$G = w_B^n Z_B \tag{8}$$

Each bureaucrat receives a net official wage w_B^n. However, we assume that all bureaucrats are (equally) corrupt and supplement their wages with the proceeds from

a corruption tax on legitimate private sector wages. The definition of corruption used in this paper is the (mis-) use of public office for personal gain. The bureaucrat faces a risk δ_B of being caught for corruption and deducts this from the proceeds of corrupt activities. Thus, the after-tax unofficial wage for bureaucrats is given by:

$$w_B = w_B^n + (1-\delta_B)\tau_C w_P^g \frac{Z_P}{Z_B} \tag{9}$$

where δ_B is the probability of being caught for corruption. We assume that workers in the other sectors are not penalised for bribing public officials and as such assign a figure of zero to the risk of being caught in the act, and that all bureaucrats earn the same amount from the corruption tax. The risk of detection varies between shadow and public sectors $\delta_B \geq \delta_S$. In an economy with a large shadow economy and a corrupt bureaucracy, the probability of being caught and punished is close to zero ($\delta_B \to 0; \delta_S \to 0$).

For the purpose of this paper it will be assumed that the proceeds of corruption, bribes, although unreported to the tax authority, are distinct from the tax evasive activities associated with the shadow economy. In the case of the former, government property (and office) is involved and in the case of the latter, it is private property. In addition the official wage of bureaucrats is taxed at source, and hence bureaucrats are unable to evade taxes on their official wage.

Government revenue is derived from taxation. Taxes are levied on income (equals output) in the legitimate private sector. Thus, any policies that affect labour or productivity in the legitimate private sector will affect tax revenues received by the bureaucracy. There are, however, some policies that affect taxation revenues that do not affect productivity in the legitimate private sector. In particular in an economy

with widespread tax arrears, tax exemptions, tax deferrals, inter-enterprise arrears, and barter are allowed, some taxes are levied but not paid and hence the government faces a weakening of its tax collection ability. Although income is declared and liable to taxation the government finds it difficult to collect the taxes. Thus tax revenues are actually given by:

$$T = \rho \tau Y_L \qquad 0 \le \rho < 1 \qquad (10)$$

where ρ is the tax collection rate and is fixed for the purpose of the paper.

The budget constraint of the government is given, rather restrictively by:

$$G = T$$

where G is government spending, and T is taxation revenue. In order to concentrate on the essential issues, we assume that there is no external debt and no seigniorage.

The government spends $G = T = \tau Y_L$ but only receives revenues of $T = \rho \tau Y_L$. Thus, $(1-\rho)\tau Y_L = def$, where def is the budget deficit. As there is no debt, the government finances the deficit by running up payment arrears.

The government has three main options when it comes to reducing the size of the budget deficit. Reduce spending (G), increase taxation revenues by increasing the tax rate (τ), and increase taxation revenues by increasing the tax collection rate (ρ).

Equilibrium employment and resource constraint

Workers move easily between the legitimate private sector and the shadow economy. Workers will move into the legitimate private sector if $w_S < w_P$, and into the shadow sector if $w_S > w_P$. When $w_S = w_P$, an equilibrium distribution between the two sectors is reached. However, the high barriers to entry into the bureaucracy, and the fact that the market does not determine the official wage of bureaucrats.

means that the market does not directly determine the movement of labour between the private sectors and the bureaucracy. The number of bureaucrats employed in the period under consideration is constant.

The full employment condition is given by:

$$Z_P + Z_S = N - Z_B \qquad \frac{\partial Z_P}{\partial Z_S} < 0;\ \frac{\partial Z_S}{\partial Z_P} < 0$$

where N is the total workforce. An increase in legitimate sector employment results in a reduction in shadow sector work. This assumes that there is no unemployment, only shadow sector activity. This is not unrealistic in countries without well-functioning welfare systems - such as Russia - where people who lose their jobs in the legitimate private/ public sectors have little or no alternative source of support if they do not engage in some form of shadow sector work.

There is a resource constraint between the legitimate private sector and the shadow economy which indicates the limitations of employment expansion, all things remaining equal. This ensures that legitimate sector employment is negatively related to shadow sector employment.

If for any reason the size of the total workforce increases (for example if there is an increase in immigrants), then both P and S will increase as workers distribute themselves according to the relative effect on marginal productivities. Equilibrium employment is given when $w_S = w_P$. That is, from equations (4) and (7),

$$(1-\tau-\tau_C)w_P = (1-\delta_S)w_S$$

$$(1-\tau-\tau_C)\alpha_L \gamma_P Z_B^{\gamma_B} Z_P^{(\gamma_P-1)} = (1-\delta_S)\alpha_S \gamma_S Z_S^{(\gamma_S-1)}$$

Solving for Z_P,

$$Z_P = \left(\frac{(1-\delta_S)\alpha_S \gamma_S Z_S^{(\gamma_S - 1)}}{(1-\tau-\tau_C)\alpha_L \gamma_P Z_B^{\gamma_B}} \right)^{\frac{1}{\gamma_P - 1}} \tag{11}$$

From (11) it follows that as employment in the legitimate private sector increases, there is an increase in the equilibrium number of shadow sector workers $\left(\frac{\partial Z_P}{\partial Z_S} > 0 \right)$ because of diminishing returns to shadow sector work.

Solving for Z_S,

$$Z_S = \left(\frac{(1-\tau-\tau_C)\alpha_L \gamma_P Z_B^{\gamma_B} Z_P^{(\gamma_P - 1)}}{(1-\delta_S)\alpha_S \gamma_S} \right)^{\frac{1}{\gamma_S - 1}} \tag{12}$$

From (12) it follows that the equilibrium level of employment in the shadow economy also increases if and the equilibrium number of legitimate private sector workers rise $\left(\frac{\partial Z_S}{\partial Z_P} > 0 \right)$. As the risks of detection for shadow sector activity increases, the size of the shadow economy falls $\left(\frac{\partial Z_S}{\partial \delta_S} < 0 \right)$.

Our basic model shows that a corrupt bureaucracy does affect the distribution of labour between the shadow and legitimate private sectors, as participation in the legal economy becomes more expensive (through the proportional tax). This confirms the results of previous studies (such as Owoye and Bendardaf (1996)) which show that corruption adversely affects economic growth through its impact on the labour and production markets.

3.5 Reduced Expenditure

The bureaucracy attempts to reduce spending to reduce the budget deficit and improve the balance of payments: IMF policies for most transition and developing countries encourage improved budget deficits.

The bureaucracy can do this by reducing the real wages of bureaucrats. In the worst case scenario where tax collection rates are very low $(\rho \to 0)$ the government may be unable to pay bureaucrats in a particular period. Instead the government informs bureaucrats that they will be paid sometime in the future, when revenues improve. Wage arrears to public bureaucrats in Russia have been a feature of post-communist transition.

Officials therefore face real wage reductions, and even the possibility that their net official wage may equal zero in any period. Assuming corrupt bureaucrats wish to maintain a constant net wage, they supplement the fall in the official wage with increased proceeds of corruption. From equation (9), the corruption tax for a given total wage of w_B is given by:

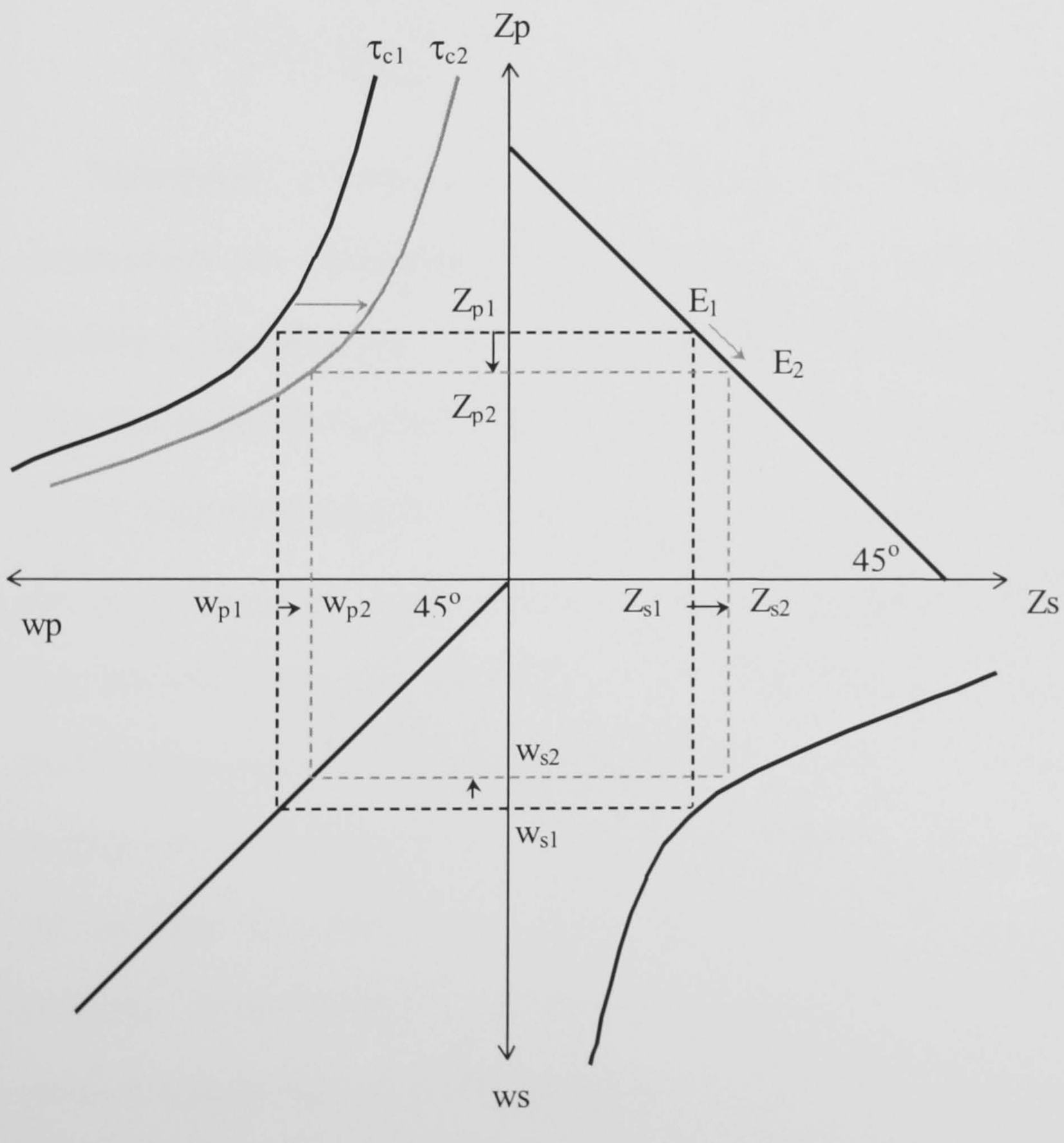
$$\tau_C = \left(\frac{w_B - (1-\tau) w_B^g}{(1-\delta_B) w_P^g} \right) \frac{Z_B}{Z_P} \tag{13}$$

From equation (13), it follows that the corruption tax increases when the real gross official bureaucratic wage decreases $\left(\frac{\partial \tau_C}{\partial w_B^g} = -\frac{(1-\tau) Z_B}{(1-\delta_B) w_g^P Z_P} < 0 \right)$. This result is supported by other studies which adopt different theoretical and empirical approaches. For example, Andvig and Moene (1990) find that the lower the salary of bureaucrats, the higher the incidence of corruption. They suggest that many developing countries are forced to cut public spending as a cure for the balance-of-payment problem: if this also implies that the real wages of civil servants are cut more than those in the private sector this will result in an increase in corruption.

The rise in the corruption tax as a result of the fall in the bureaucratic official wage results in a fall in legitimate private sector employment $\left(\frac{\partial Z_P}{\partial \tau_C} < 0 \right)$ and an

increase in shadow sector activity $\left(\frac{\partial Z_S}{\partial \tau_C} > 0\right)$. As legitimate private sector employment falls, taxation revenues fall, both as a result of less employment $\left(\frac{\partial T}{\partial Z_P} > 0\right)$ and lower tax collection rates $\left(\frac{\partial \rho}{\partial \tau_C} < 0\right)$. Registered output falls $\left(\frac{\partial Y_L}{\partial Z_P} > 0\right)$. Shown diagrammatically below,

Figure 3.4: The impact of a fall in real bureaucratic wages on employment



The economy is initially in equilibrium at E_1. The fall in real official bureaucratic wages results in a rise in the corruption tax from τ_{C1} to τ_{C2}. The rise in the corruption tax lowers the (unofficial) legitimate private sector wage at each and every level of employment, from w_{P1} to w_{P2}. The corruption effect results in a rise

in shadow sector employment $(from\ Z_{S1}\ to\ Z_{S2})$ at the expense of legitimate private sector employment $(from\ Z_{P1}\ to\ Z_{P2})$. Real wages in the shadow sector fall in line with increased employment in that sector, from w_{S1} to w_{S2}. The final equilibrium position of the economy is E_2.

In the worst case scenario, bureaucrats may be unpaid in a particular period. That is, $w_B^g = 0$. In which case the corruption tax will be at its maximum.

$$\tau_C = \left(\frac{w_B - (1-\tau)w_B^g}{(1-\delta_B)w_P^g} \right) \frac{Z_B}{Z_P}$$

Interestingly, private sector wage arrears $(w_P^g \to 0)$ - also a feature of post-communist Russia - would imply there is no private sector wage on which bureaucrats can levy a corruption tax. The corrupt bureaucrats lose their corruption tax base. Thus, the net unofficial wage of bureaucrats would be approximately equal to their net official wage (from equation (12) $w_B = w_B^n$). That is, unless private sector workers run up corruption tax arrears! The running up of private sector wage arrears may have inadvertently provided an antidote to the corruption effect that is associated with public sector wage arrears. This result is indirectly supported by Andvig and Moene's findings (see explanation below equation 13) that if the real wages of civil servants are cut more than those in the private sector this will result in an increase in corruption. In our model, it is possible that those in the private sector had their wages cut by at least the same amount as bureaucrats, that is, to zero.

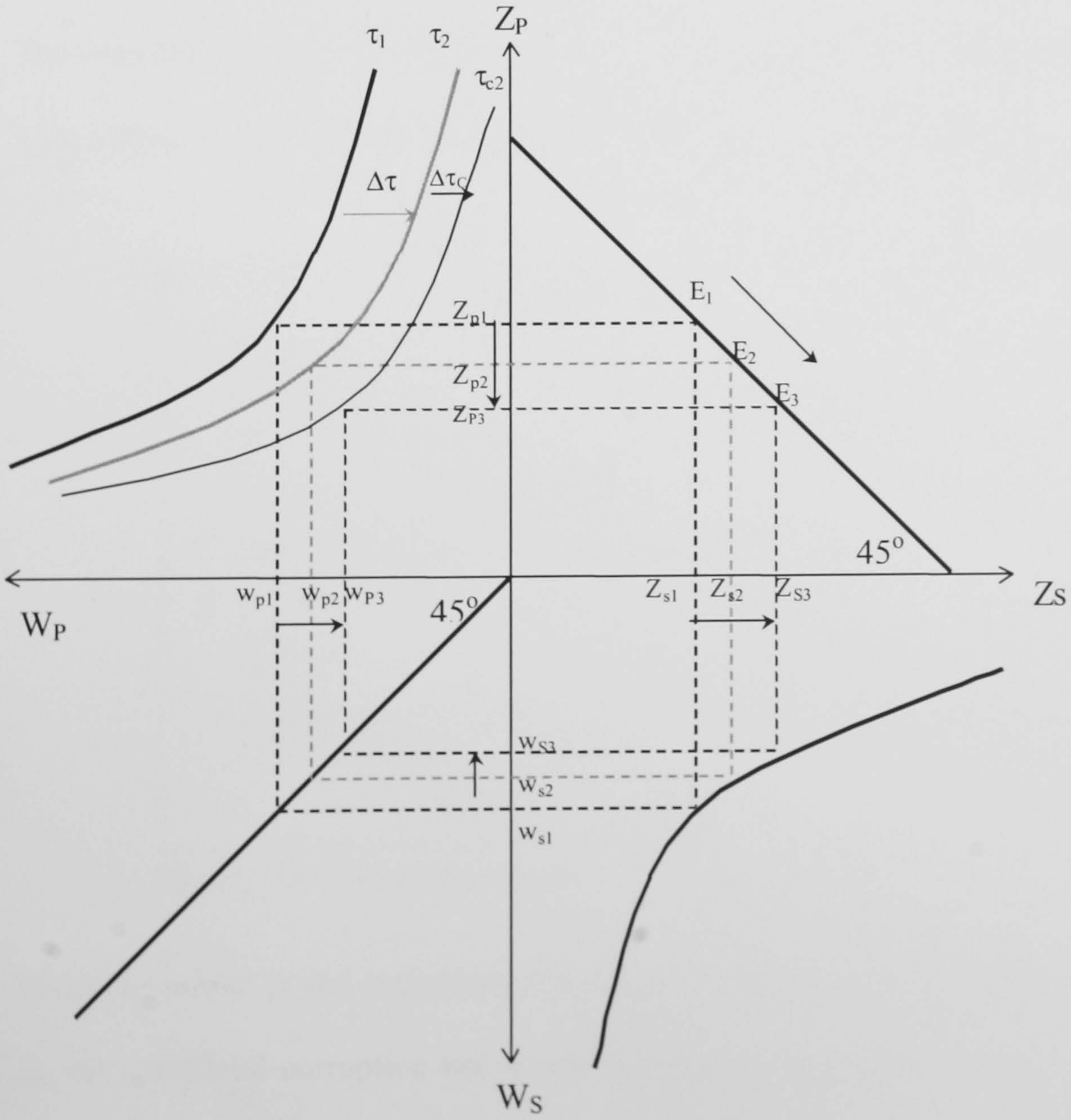
3.6 Increased Taxation

In an economy with a corrupt bureaucracy and a shadow economy, a rise in the official tax rate has a dual effect on employment:

(1) Disincentive effect on employment in the taxed sector $\left(\frac{\partial Z_P}{\partial \tau} < 0; \frac{\partial Z_S}{\partial \tau} > 0\right)$. This effect is well documented and researched.

(2) Corruption effect $\left(\frac{\partial \tau_C}{\partial \tau} > 0\right)$. As the net official bureaucratic wage falls from a rise in official taxation, the corruption tax rises and there is a rise in shadow sector employment $\left(\frac{\partial Z_S}{\partial \tau_C} > 0\right)$at the expense of legitimate private sector employment $\left(\frac{\partial Z_P}{\partial \tau_C} < 0\right)$. From equation (9), $\left(\frac{\partial \tau_C}{\partial \tau} = \frac{w_B^g Z_B}{(1-\delta_B) w_g^p Z_P} > 0\right)$. The dual effect on employment is shown in the diagram below.

Figure 3.5: Dual impact of an increase in official tax rates on employment



The economy is initially in equilibrium at E_1. A rise in the official tax rate τ_1 to τ_2 results in a fall in legitimate sector employment $(from\ Z_{P1}\ to\ Z_{P2})$ and a rise in shadow sector activity $(from\ Z_{S1}\ to\ Z_{S2})$. However the rise in the official tax rate results in a fall in the net official bureaucratic wage. This leads to a rise in the corruption tax to τ_{C2}, and a corruption effect resulting in a further fall in employment in the legitimate private sector $(from\ Z_{P2}\ to\ Z_{P3})$, and a further rise in shadow sector employment $(from\ Z_{S2}\ to\ Z_{S3})$. The final equilibrium position of the economy is E_3.

The impact of an increase in official tax rates on tax revenues is less clear. The optimal rate of tax is the tax rate at which tax revenues are maximised. Usually a rise in the official tax rate will result in a rise in taxation revenue if the official tax rate is less than the optimal rate of tax $(\tau \leq \tau^*)$. The Laffer curve is shown below for the case where the optimal rate of tax occurs when the tax rate is 0.5 (50%):

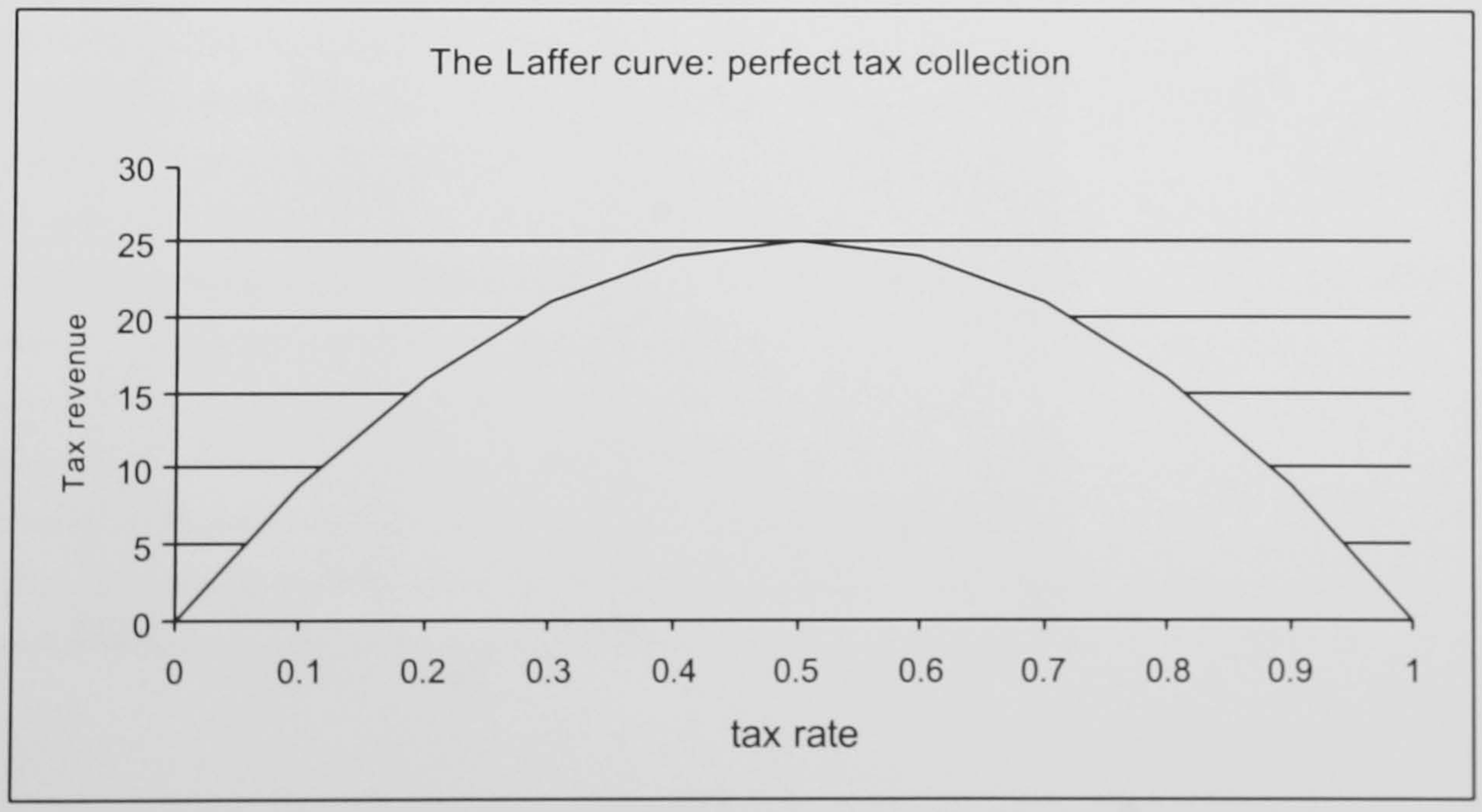


Figure 3.6: The Laffer Curve

However in our model legitimate private sector employment decisions are also based on the unofficial corruption tax levied by corrupt bureaucrats. A rise in the official

tax rate causes a rise in the corruption tax rate which reduces output further and has a negative impact on taxation revenues. Indeed, taxation revenues in the presence of bureaucratic corruption are lower at every rate of tax than when corruption is absent. Taxation revenues are therefore maximised when the official rate of tax *and* the corruption tax are equal to the optimal rate of tax. That is, when $\tau + \tau_C = \tau^*$. Thus taxation revenues will rise as long as $\tau \leq \tau^* - \tau_C$.

In tables 3.4 and 3.5 below we use the equation for taxation revenues from equation 10, $T = \rho \tau Y_L$, to simulate taxation revenues with and without corruption. In table 3.4 we assume that output declines by units of 10 as the tax rate rises by ten percentage points and that there is no corruption. The optimal rate of official taxation occurs at 50%. The tax collection rate, $\rho = 0.9$, is constant for the period in question.

Table 3.4: Tax revenues in a non-corrupt economy where output falls by ten units for every ten percentage point increase in the official tax rate

ρ	τ	Y_L	T (no corruption)
0.9	0	100	0
0.9	0.1	90	8.1
0.9	0.2	80	14.4
0.9	0.3	70	18.9
0.9	0.4	60	21.6
0.9	0.5	50	22.5
0.9	0.6	40	21.6
0.9	0.7	30	18.9
0.9	0.8	20	14.4
0.9	0.9	10	8.1
0.9	1	0	0

However, in the presence of corruption, a ten percentage point increase in the tax rate results in output falling by *more* than ten units. This is because the rise in the official tax rate leads to an associated rise in the corruption tax rate: we assume that

each ten percentage point increase in the official tax rate results in a 2.5 percentage point increase in the corruption tax rate. Table 3.5 shows that output now falls by 12.5 points for each ten percentage point increase in the official tax rate. Taxation revenues are now lower at each and every level of the official tax rate. Indeed, the optimal rate of official taxation now occurs at 40% rather than 50%.

Table 3.5: Tax revenues in a corrupt economy where output now falls by 12.5 units for every ten percentage point increase in the official tax rate

ρ	τ	τ_C	$\tau + \tau_C$ (Effective rate of tax)	Y_L	T (corruption)
0.9	0	0	0	100	0
0.9	0.1	0.025	0.125	87.5	7.875
0.9	0.2	0.05	0.25	75	13.5
0.9	0.3	0.075	0.375	62.5	16.875
0.9	0.4	0.1	0.5	50	18
0.9	0.5	0.125	0.625	37.5	16.875
0.9	0.6	0.15	0.75	25	13.5
0.9	0.7	0.175	0.875	12.5	7.875
0.9	0.8	0.2	1	0	0
0.9	0.9	0.225	1.125	0	0
0.9	1	0.25	1.25	0	0

Figure 3.7 shows the Laffer curves with and without corruption.

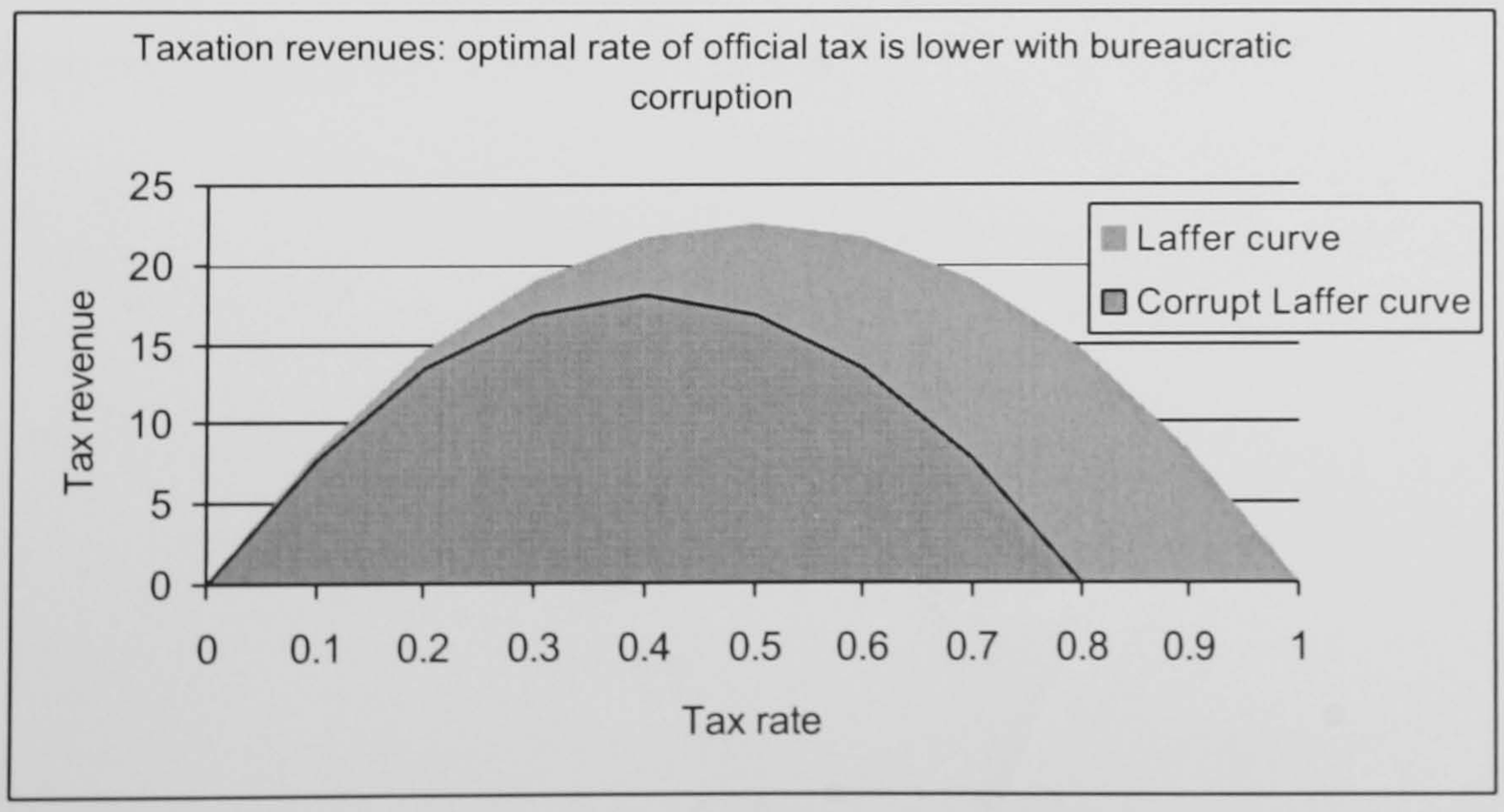


Figure 3.7: Diagram showing simulated Laffer curves with and without corruption

This analysis raises questions about the optimal rate of tax in the presence of a corruption tax, and has important policy implications.

Figure 3.8 shows, more generally, Laffer curves with and without corruption present. These more general curves will be used in the theoretical analysis to follow below.

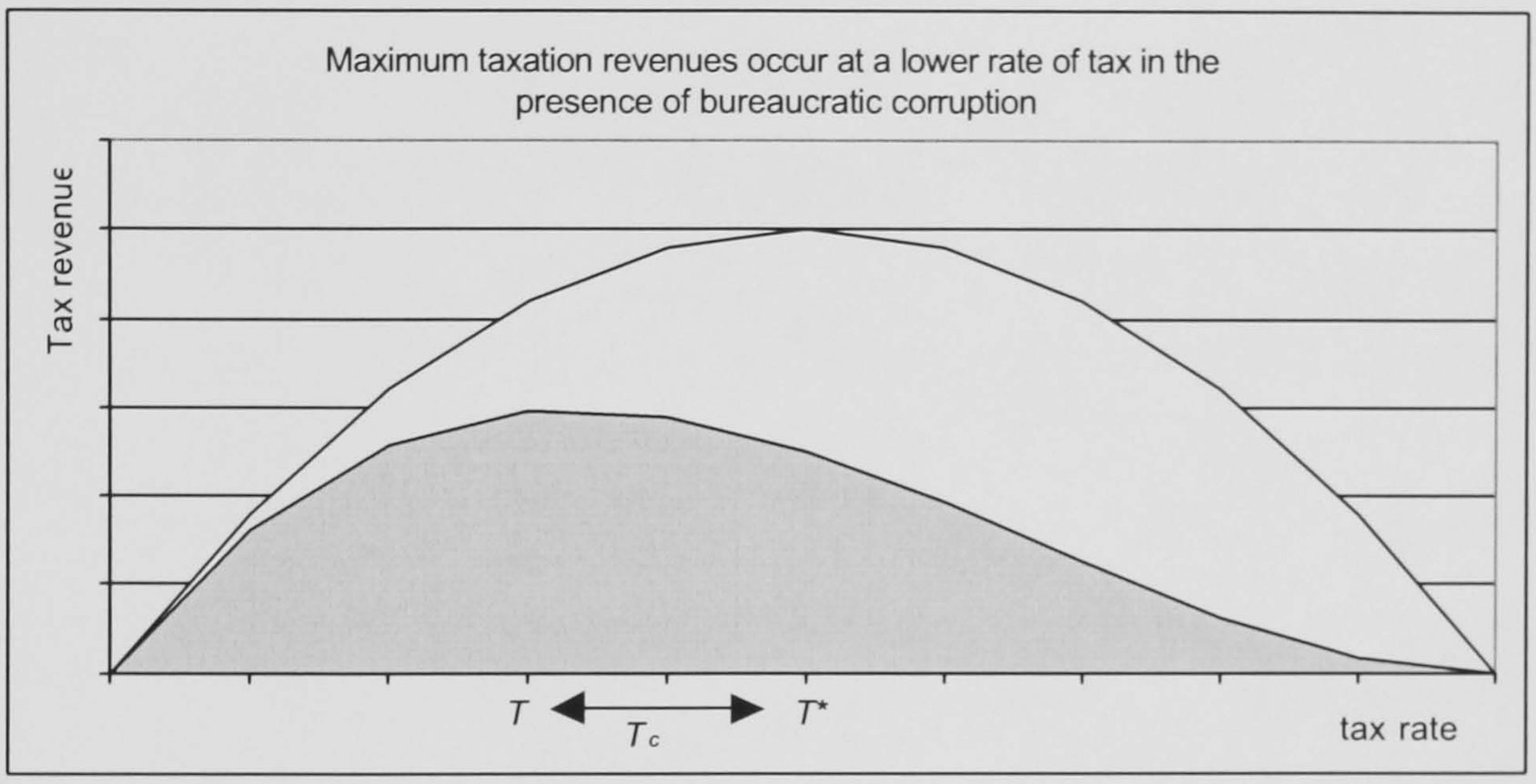
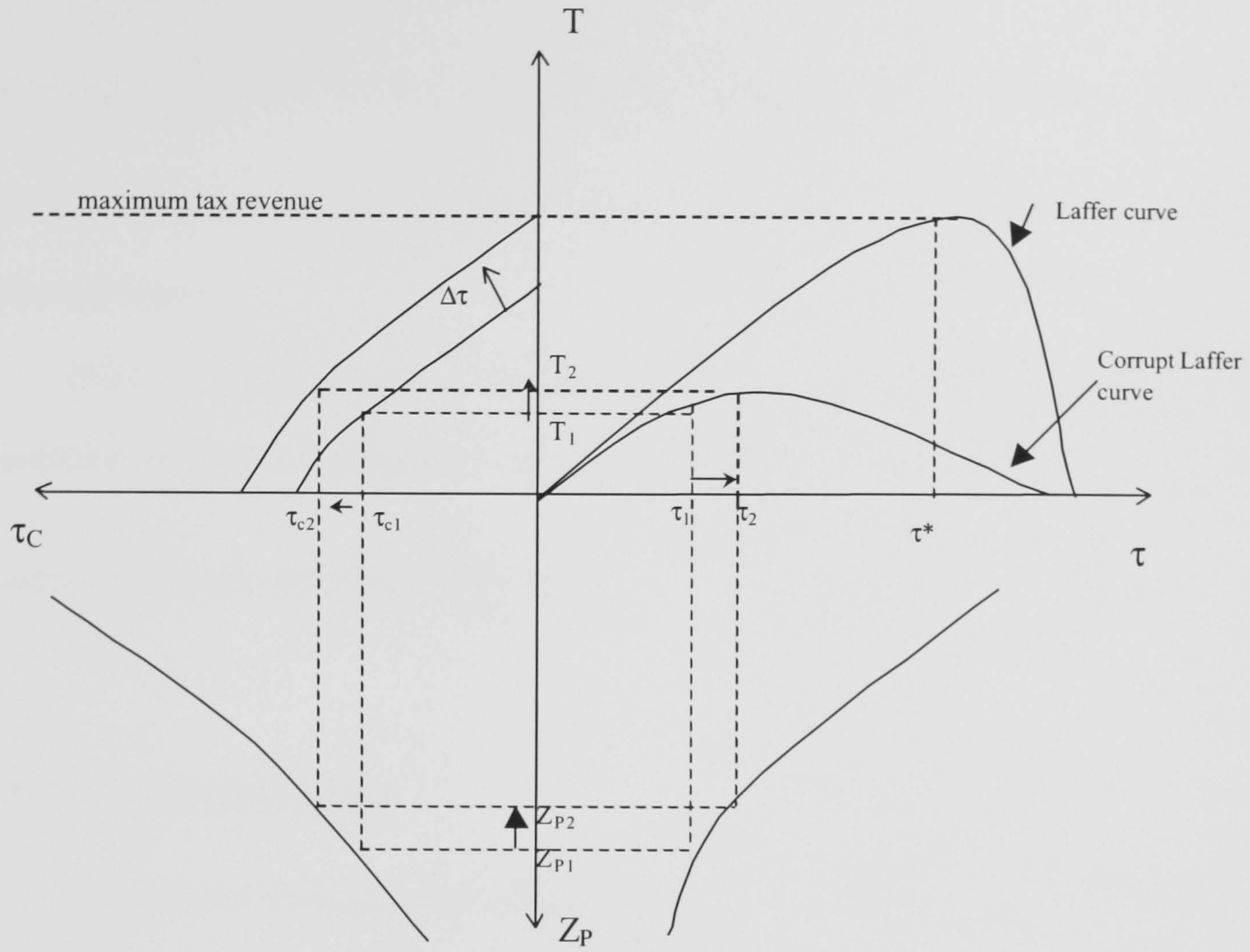


Figure 3.8: Taxation Revenues are lower in the presence of bureaucratic corruption

The impact of an increase in tax rates on the corruption tax, legitimate sector employment, and taxation revenues is shown in the diagram below.

Figure 3.9: Impact of an increase in tax rates on taxation revenues



A positive corruption tax reduces taxation revenues at each and every level of official tax rates. As official tax rates rise, the corruption tax also increases. Tax revenues continue to rise as long as $\tau \leq \tau^{*} - \tau_{C}$. Legitimate private sector employment falls as official tax rates rise, both through the disincentive effect and through the corruption effect.

The government can help prevent an increase in corruption by increasing the gross official wage of bureaucrats in line with the tax increase to keep their net official wage constant.

Alternatively the government could increase tax revenues and tax collection rates. An improvement in tax collection rates (ρ) does not directly affect the distribution of labour between the legitimate private sector and the shadow

economy $\left(\frac{\partial Z_P}{\partial \rho} = 0; \frac{\partial Z_S}{\partial \rho} = 0 \right)$. There is however an improvement in taxation revenues ($\frac{\partial T}{\partial \rho} > 0$). The main reason for this is that employment decisions are based on the official rate of tax, while the weakness of the tax base depends on structural characteristics.

Policies which advocate "good governance", for example, see recent IMF publications, involve removing the opportunities for corruption and increasing the detection rates of corruption $\left(\frac{\partial \tau_C}{\partial \delta_B} < 0 \right)$.

3.7 Comparison

Our analysis raises the following question: is the corruption effect generated by tax increases greater or less than the corruption effect generated by reduced bureaucratic wages. That is, is

$$\left| \frac{\partial \tau_C}{\partial \tau} \right| > \left| \frac{\partial \tau_C}{\partial w_B^g} \right|$$

The corruption effect generated by tax increases in greater than the corruption effect generated by reduced bureaucratic wages as long as:

$$\frac{w_B^g Z_B}{(1-\delta_B) w_g^p Z_P} - \frac{(1-\tau) Z_B}{(1-\delta_B) w_g^p Z_P} > 0$$

which occurs if $w_B^g > 1-\tau$

Thus, the corruption effect of increased official taxation outweighs that of decreased expenditure in all cases except where $w_B^g < 1-\tau$. This would occur if bureaucrats are unpaid in a particular period ($w_B^g = 0$), as is the case when the

government chooses to run up wage arrears to public bureaucrats instead of paying them. In which case the corruption tax associated with public sector wage arrears will be at its maximum $\tau_C = \left(\frac{w_B - (1-\tau) w_B^g}{(1-\delta_B) w_P^g} \right) \frac{Z_B}{Z_P}$. This will exceed the corruption effect from increased taxation.

3.8 Fiscal Policy in Russia and the Results of our Model

We examine Russia's recent fiscal policy in terms of expenditure and taxation revenues and then examine whether the results predicted by the analysis of our model have been observed in post-communist Russia. As the data we have for corruption start from 1996, this is the period we will focus most of our efforts on.

There is almost unanimous agreement that one of the most important causes of the 1998 Russian crisis was the persistent fiscal deficits that prevailed since 1992 which were associated with high expenditure, an outmoded tax regime, the slow restructuring of enterprises, substantial shadow and barter economies, and corruption. This was neatly summarised by the World Economic Outlook (October 1998). "Although external developments, including the Asian crisis and associated weakness of energy prices, contributed to Russia's difficulties, domestic policy shortcomings were more important. In particular, the failure over many years to bring the fiscal situation under control led to levels of public debt and debt service payments that increasing appeared unsustainable. The fiscal problems, in turn, originated in failure to reform the tax system, inadequate tax collection that formed part of a culture of

nonpayment, lack of spending discipline in important areas, and slow progress in structural reform...." (p.7).

After the 1998 economic crisis, the government decreased expenditures to more manageable levels.

Table 3.6: Federal Budget Expenditures (% of GDP)

	1996	1997	1998	1999	2000	2001
Expenditures	19.4	19.0	15.2	15.2	13.5	14.7

Source: Russian Economic Trends

More important, though, was the improvement in tax collection rates post-1998. In fact, there seem to have been two distinct periods of tax policy in Russia: 1992-1999, and 2000 to date.

Tax policy from 1992-1999

There was no comprehensive overhaul of Russia's tax regime during this period. Slow and inconsistent tax reforms were attempted, and deep political and economic tensions lay in tax reform. A larger part of the tax burden fell on enterprises than on individuals, and these enterprises faced taxes which were based on revenue not profit.

In addition, the legislation governing the tax system was frequently changed and the tax regime lacked transparency. Widespread tax avoidance, tax deferrals and tax privileges caused the tax base to shrink. The deterioration in tax revenues were also be blamed on the decline in output and profits, reductions in certain rates (such as export tariffs), and the deterioration in tax discipline. The table below gives an indication of tax revenues which rose by only 1.5 percent of GDP over a four-year period.

Table 3.7: Federal Budget Taxation revenue (% of GDP)

	1996	1997	1998	1999
Tax revenue	9.9	10.1	8.8	11.4

Source: Russian Economic Trends

Poor taxation revenues in Russia appear to be the result from two main factors: a weak tax base, and a rise in non-monetary means of payment.

(I) Poor Tax Collection

The 1997 EBRD *Transition Report* recognised that Russia's shrinking tax base was caused not only by the decline in output and profits but also by the impact of tax exemptions, tax deferrals and other tax concessions. The *Report* suggests that at the end of 1996 total tax concessions amounted to an estimated Rb 163 trillion (7.2% of GDP) and tax arrears amounted to Rb 128 trillion (5.7% of GDP). There has also been an increase in tax evasion: at the beginning of 1997 about one-third of enterprises did not pay any taxes, and only 16.6% of enterprises were regularly paying taxes.

(II) Non-Monetary Means of Transactions

Gara (2001) suggests that in 1997 banks and non-financial enterprises issued about 27.5 trillion promissory notes, equal to 1.1% of GDP, and barter accounted for approximately half of inter-enterprise transactions in 1998. As such, only a third of the overall amount of all transactions are monetised.

Causes

Inter-enterprise arrears

The growth in inter-enterprise arrears and barter in Russia has given rise to debate about the causes of these phenomena. Treisman (2000) suggests that overdue payables to suppliers in industry, agriculture, transport and construction increased from 6.6% of GDP in 1993 to 17.7% in 1998. The percentage of total payables that were overdue increased from 39% in 1993 to 56% in 1998. Treisman suggests that the main reason for this trend is political. In particular, "politically inspired cross-subsidization of certain less profitable sectors (agriculture, ferrous metallurgy) by more profitable ones (electricity, gas, and pipeline transport)" (p.234). He quotes Sergey Dubinin, the deputy chairman of the board of Gazprom, saying "all kinds of political pressures are exerted to keep the company from cutting off delinquent clients - from government resolutions prohibiting cutoffs to specific organizations to more subtle pressures" (p.234).

Barter

Barter is undertaken by both profitable and loss-making enterprises, although utilities appear to play a disproportionately bigger role in the barter economy. Barter is attractive to many firms and enterprises as it helps to avoid government restrictions on price cuts and taxation. In addition, barter is accepted as a means of transaction in an economy with huge political pressures to continue dealing with unprofitable business partners. Other reasons for the spread of barter include the role of monetary policy in severely demonitising the economy

Implications

A large number of non-monetary transactions result in various implications for the economy.

(i) Transactions costs

Non-monetary means of transacting, especially barter. results in a higher level of transaction costs.

(ii) Incentives to reduce costs

There is less incentive to reduce costs, as a higher price for a company's products transferred to suppliers under barter enable a company to offset a larger proportion of its liabilities to its suppliers.

(iii) Confusion

There is confusion about the multiple prices generated by cash and non-cash rubles. A ruble in cash is worth more than a ruble's worth of bartered goods.

(iv) Distorted information

The widespread use of non-monetary means of payments leads to a distortion of company accounts/ company information. This proves particularly difficult for investors and creditors.

(v) Tax avoidance/ tax evasion

The growing use of non-monetary means of payment in the economy leads to a growing problem of tax non-payment, tax evasion, and tax avoidance.

Tax policy from 2000-2002

The Russian government has focused on improving tax collection rates and reducing tax arrears since the year 2000. The new Tax Code which was introduced in 2000 changed the structure of tax revenues and improved taxation revenues. The government adjusted import and export tariffs, pegging crude oil export tariffs to world prices: the tariff is zero when oil prices are below $12.50 per barrel, and then

there are a series of tariffs up to a maximum of $45 per tonne when the oil price is $32.50 per barrel or higher.

For the first time since 1992, the federal budget run a surplus in the year 2000 mainly because of high revenues from increased exports and rapid economic growth. Oil export duties alone contributed R171 billion, about 15% of total federal budget revenue (compared to only 7% in 1999). The budget revenue exceeded target revenues by almost 40% (Russian Economic Trends, 2001).

During 2000, non-monetary means of payment begun to give way to monetary forms of payment: the share of barter and promissory notes declined significantly.

The federal budget law for 2001 (which was passed by the Duma in December 2000) aimed to achieve a balanced budget for the first time in post-Soviet history and without drastic expenditure cuts.

Total tax arrears to the budget from the beginning of the 1990s to the end of 2001 amounted to R475 billion, although in 2001 tax arrears increased by only R11 billion compared with R86 billion growth in 2000 (RET, 2001).

The table below shows Russia's federal taxation revenue which grew by about 2.3% between 1999 and 2000 (higher than the 1.5% tax revenue growth over the four-year period from 1996-1999) and by 2.5% between 2000 and 2001.

Table 3.8: Federal Budget Taxation revenue (% of GDP)

	1999	2000	2001
Tax revenue	11.4	13.7	16.2

The Results of Our Model and the Outcomes in Russia

Our results show that there are consequences for employment, output, and taxation revenues of fiscal policy-induced changes in bureaucratic corruption. An

obvious restriction is the short time series data available for Russia, which makes a more in depth and concrete empirical analysis impossible. Analysis of the data in this section is therefore intended to be indicative, rather than an attempt to produce concrete empirical results.

Result 1:

Corruption does affect the distribution of labour between the shadow and legitimate private sectors as participation in the legal economy becomes more expensive (through the proportional tax). A rise in corruption results in a fall in legitimate private sector employment and output.

The date we use for corruption is from the Corruption Perceptions Index (henceforth CORPI). Transparency International's Corruption Perceptions Index (2000) discusses the methodology, limitations, and problems with the data. The data for Russia are only available annually, from 1996-2001. Perfect scores (no corruption) equal 10 points, while totally corrupt economies gain a score of 0 points. Thus the higher the score the less corrupt the economy.

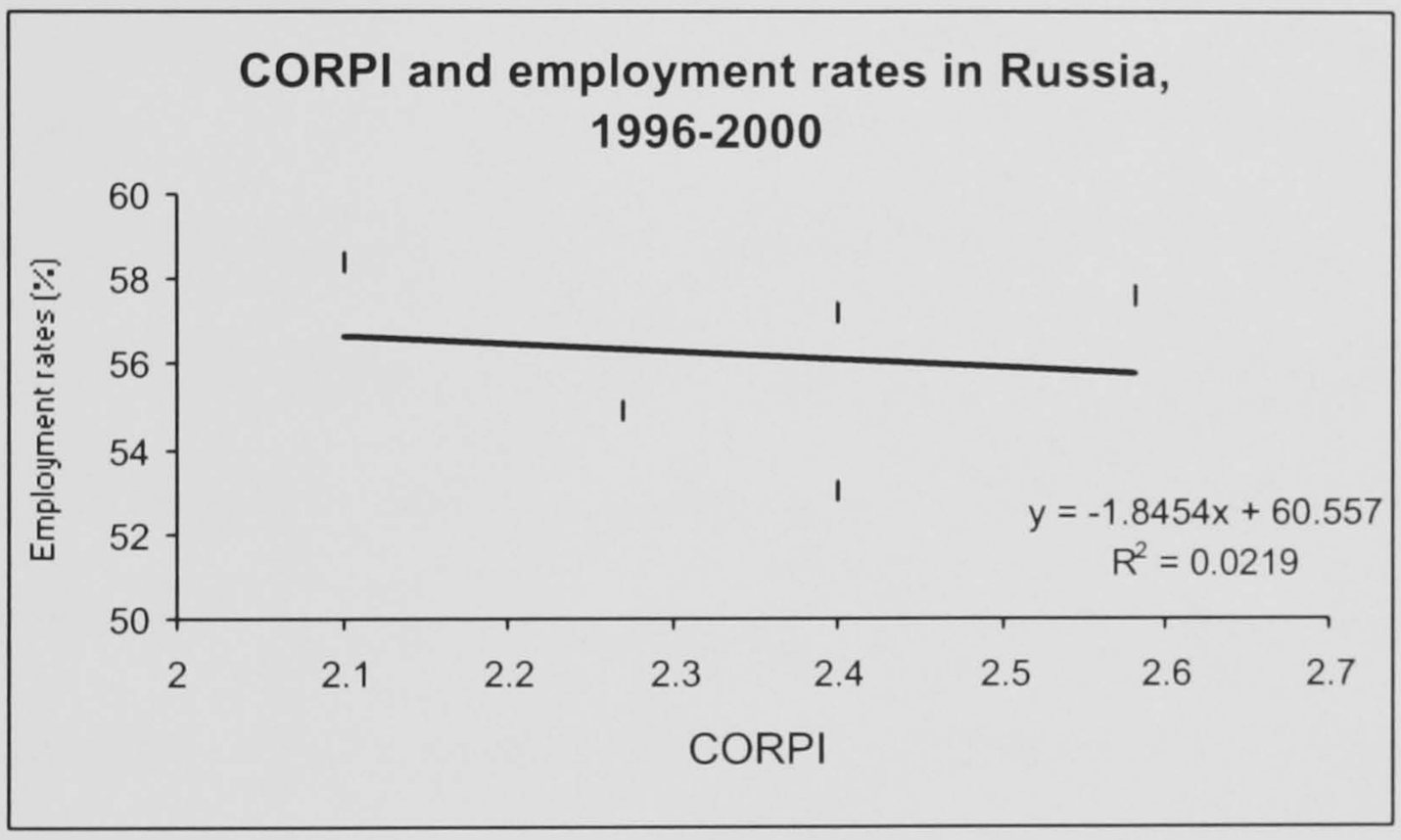
We use employment data given by the Russian authorities. The data are the employed population as a percentage of the 15 to 72 year age group. The data are only available until the year 2000. From the first result of our model, we expect a positive empirical relationship between employment and the CORPI: as the CORPI improves, employment should rise.

Table 3.9: CORPI and employment rates in Russia

	1996	1997	1998	1999	2000
CORPI	2.58	2.27	2.4	2.4	2.1
Employment	57.6	54.9	53.0	57.2	58.4

Sources: Corruption Perceptions Index; Goskomstat Rossii (2002), Rossiiskii Statisticheskii Ezhegodnkik 2001. Statisticheskii Sbornik, Moscow: Ofitsial'noe izdanie, p.134.

Figure 3.10: Graph showing CORPI and employment rates in Russia (with trend line)



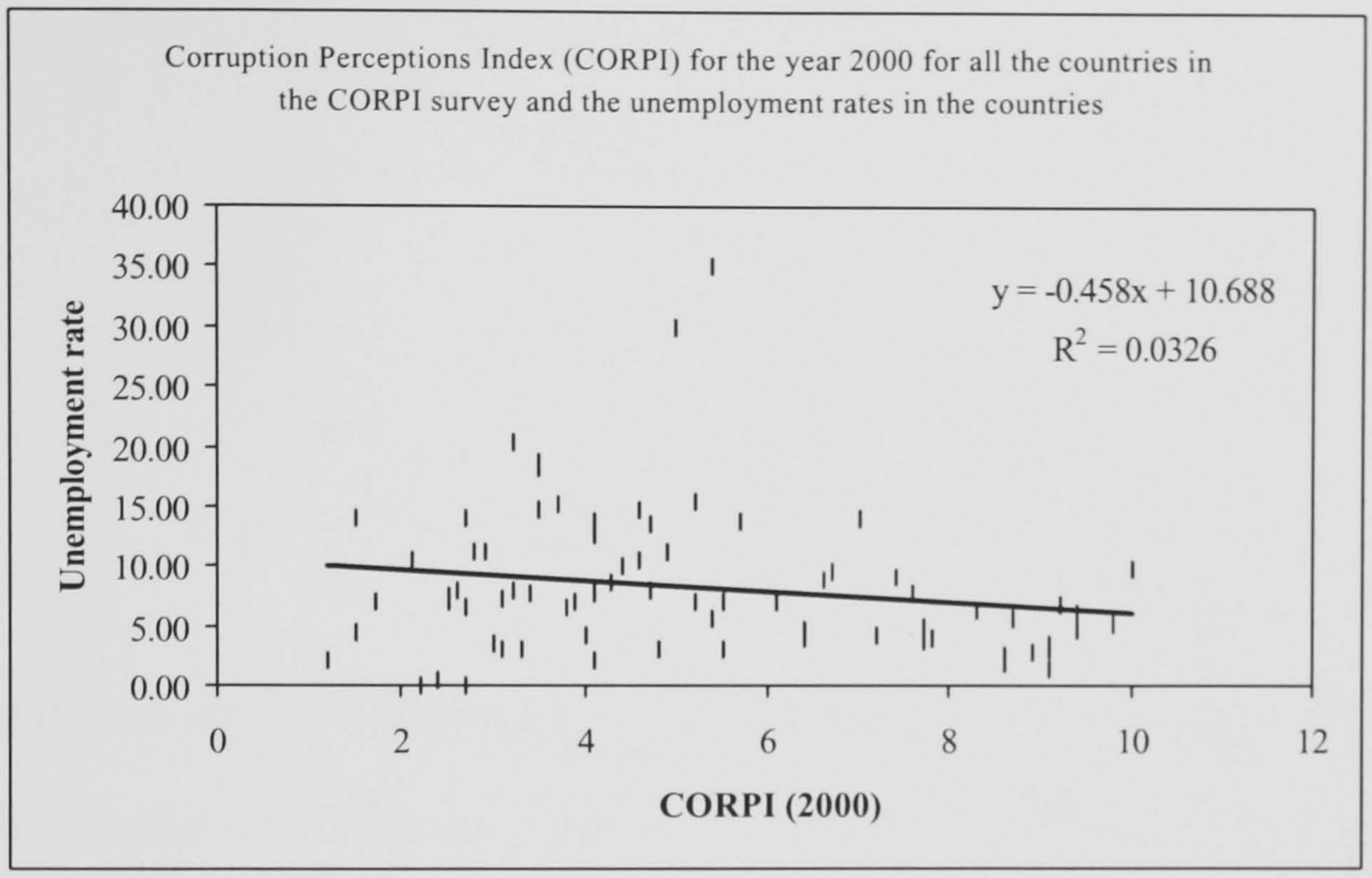
The trend line in the diagram above, which is not statistically significant, indicates a negative relationship between CORPI and employment rates, contrary to the prediction of our theoretical results. Looking at the data more closely, between 1996 and 1997 there was a deterioration in the CORPI and, as our model predicts, a fall in employment. However, the expected relationship appears to break down at this point. Between 1997 and 1998 there is an improvement in the CORPI but a *fall* in employment. Then in 1999 there is an improvement in employment with the CORPI remaining at its new improved level. The CORPI deteriorates again in 2000, accompanied by a *rise* in employment.

There could be any number of reasons for the break down of the relationship between the CORPI and employment rate, aside from the data issues connected with the measurement of the CORPI and the employment rates. For instance, there could be a lag between changes in corruption and changes in employment because of impediments to labour mobility between the legitimate private sector and the shadow economy (such as employment contracts). Alternatively, Russia's unique labour market characteristics which involve implicit contracts between firm and workers about hours of work and pay could distort the relationship between corruption and employment data.

In order to establish an indicative relationship between the CORPI and employment rates with a larger data set the CORPI and unemployment rates in a cross-section of countries will be examined. Data on employment rates as percentages rather than amounts are not readily available in all cases. As such we use unemployment data. From result 1 we expect a negative association between unemployment and the CORPI: as the CORPI improves, unemployment falls.

Below is a graph of the countries featured in the Corruption Perceptions Index (2000) and their unemployment rates.

Figure 3.11: CORPI for the year (2000) for all the countries in the CORPI survey and the unemployment rates in the countries



This graph indicates a negative relationship between the variables: as corruption improves, unemployment falls.. However, the result cannot be verified for Russia alone because of lack of data.

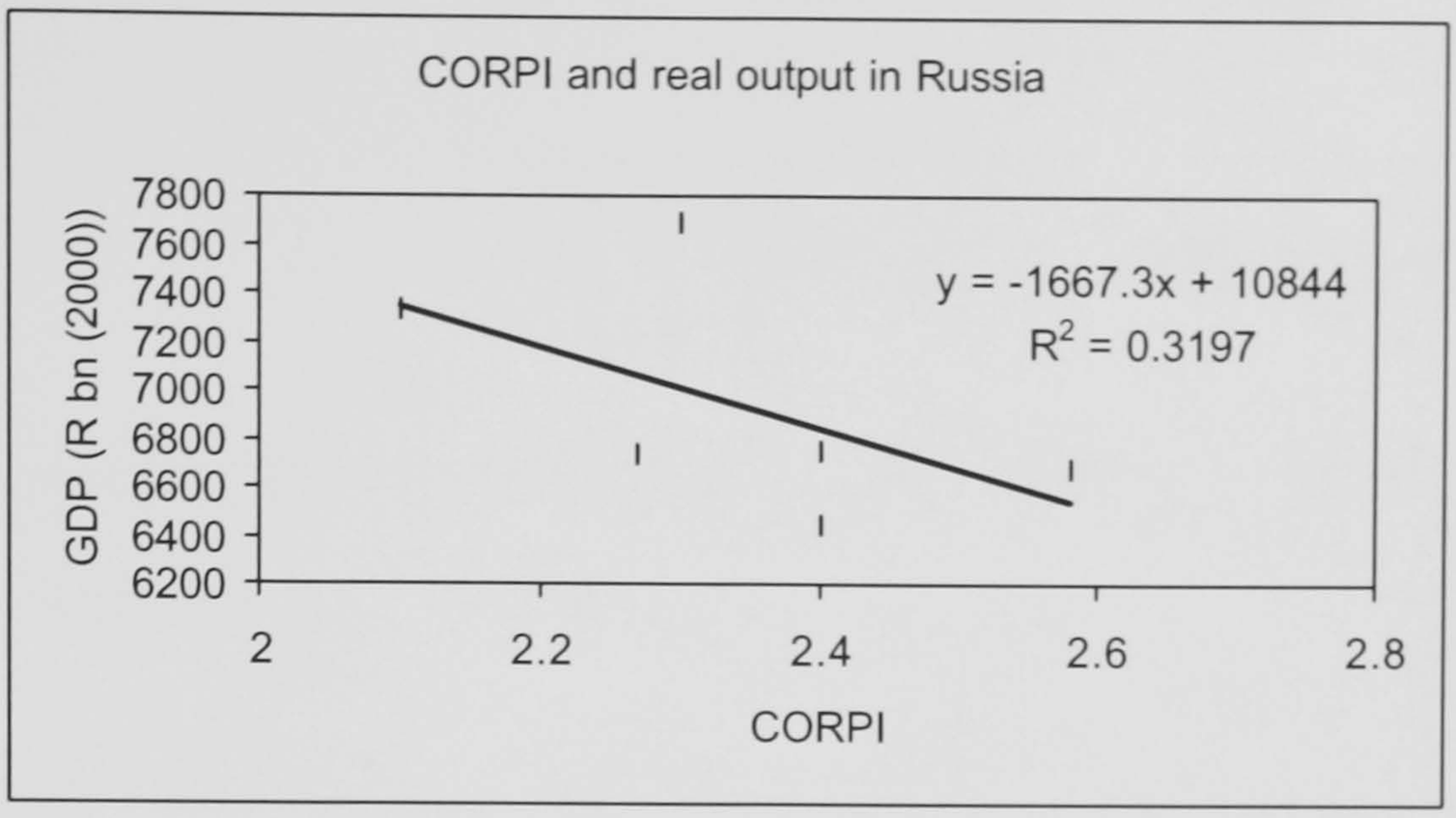
Our theoretical model also predicts a positive relationship between corruption and output: as corruption improves, output improves.

Table 3.10: CORPI and real output in Russia

	1996	1997	1998	1999	2000	2001
CORPI	2.58	2.27	2.4	2.4	2.1	2.3
GDP (R bn 2000)	6677	6734	6445	6749	7335	7696

Sources: Corruption Perceptions Index
Russian Economic Trends

Figure 3.12: Diagram showing CORPI and real output in Russia



Output rises steadily from 1996 until 2001, with the exception of a fall in 1998. Corruption, on the other hand, fluctuates over the six-year period. There is no indication of a positive correlation between CORPI and output for this data set.

Result 2:

A fall in bureaucratic wages results in a rise in corruption. The rise in corruption has a negative effect of employment.

We have suggested that the data appear to indicate a negative correlation between corruption and unemployment in result 1 above for a cross-section of countries. We now move on to examine whether there are any indications that a fall in bureaucratic wages might suggest an associated rise in corruption.

There is no useful data on public sector wages for 1996-2001 but there is data on government expenditure. We expect, from our theoretical results, that a reduction in government expenditure may be associated with an increase in corruption or vice versa.

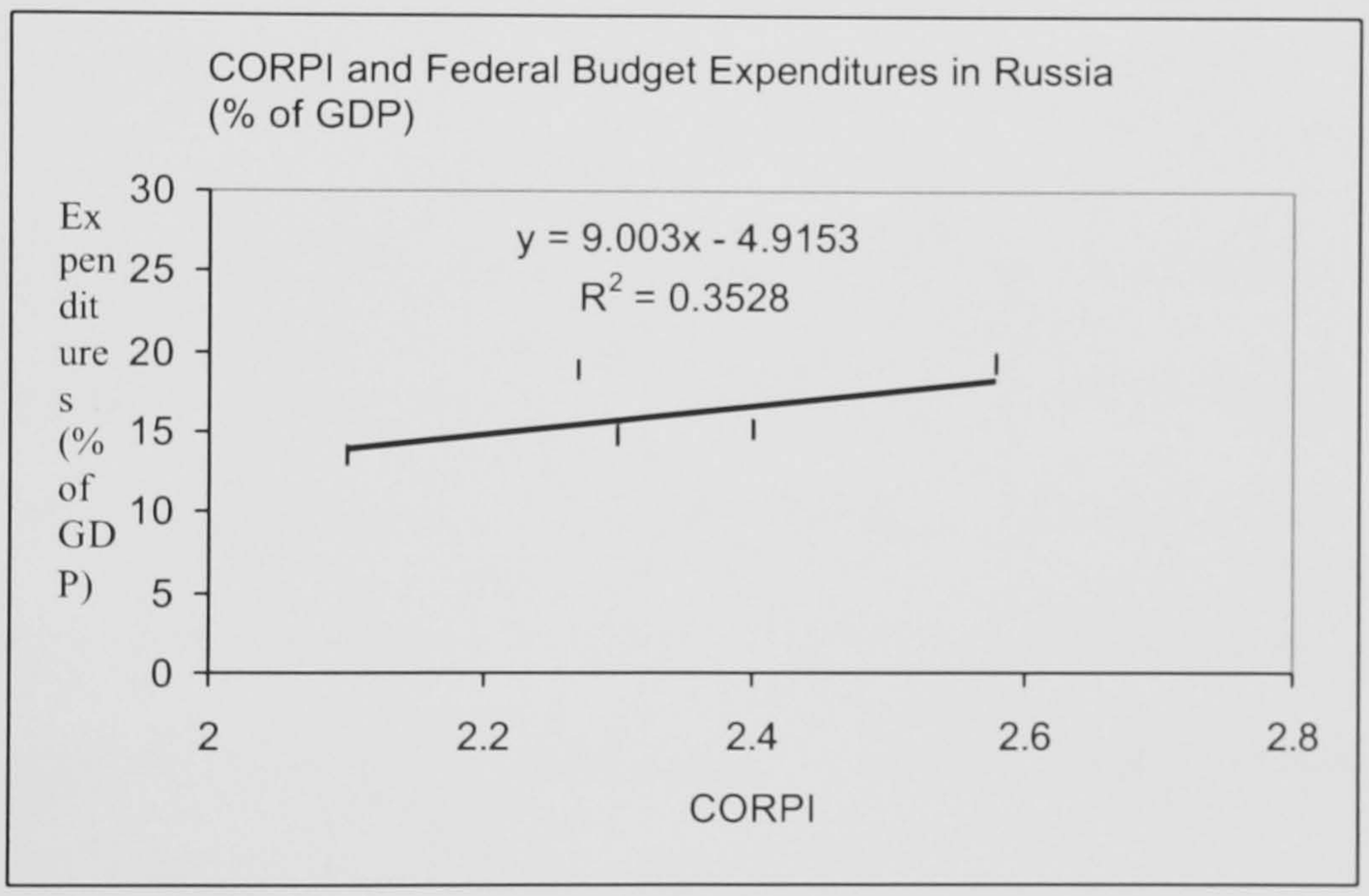
Table 3.11: CORPI and Federal Budget Expenditures (% of GDP)

	1996	1997	1998	1999	2000	2001
CORPI	2.58	2.27	2.4	2.4	2.1	2.3
Expenditures	19.4	19.0	15.2	15.2	13.5	14.7

Source: Russian Economic Trends

The expected relationship holds for the years, 1996-97, for 1998-99, and for 2000-2001, but not consecutively for 1996-2001.

Figure 3.13: CORPI and Federal Budget Expenditures (% of GDP)



When the data set is plotted in a diagram (above) the indicative trend line suggests a positive correlation between an increase in expenditure and an improvement in the CORPI, as suggested by our theoretical result.

Result 3:

An increase in tax rates results in an increase in corruption which negatively affects employment.

This is a difficult relationship to test empirically at the best of times, especially as tax rates do not change annually whereas our corruption data does. We expect some indication of a positive relationship between tax rates and corruption: as tax rates rise, corruption rises.

Income tax rates in Russia changed in 2001 compared to 2000: personal income tax was reduced to a flat rate of 13% compared with three income tax bands in the year 2000 (12%, 16% and 25%). Our model predicts that corruption should improve over this period. In fact, it did. The CORPI improved from 2.1 in the year 2000 to 2.3 in 2001.

Result 4:

An improvement in tax collection rates (ρ) does not directly affect the distribution of labour between the legitimate private sector and the shadow economy. There is however an improvement in taxation revenues. The main reason for this is that employment decisions are based on the official rate of tax, while the weakness of the tax base depends on structural characteristics such as a corrupt bureaucracy.

As discussed earlier, Russia has worked on improving tax collection in recent years and has experienced an associated rise in tax revenues.

3.9 Conclusion

We develop a three-sector model with a corrupt bureaucracy to analyse the consequences for employment, output, and taxation revenues of budgetary policy-induced changes in corruption. We model corruption as a proportional tax on labour income, and define the corruption effect as the negative impact of an increase in

corruption on legitimate private sector employment and output. An important assumption is that bureaucrats aim to maintain a constant predetermined real wage.

We suggest that some of the budgetary policies pursued by the Russian government, namely reduced spending and increased taxation resulted in an increase in the corruption tax and an associated decrease in employment, output, and taxation revenues.

We also suggest that while in general the corruption effect of increased taxation and inflationary finance exceeds that of reduced spending, if reduced spending results in wage arrears to public bureaucrats then the corruption effect of reduced spending will exceed that of either increased taxation or inflationary finance.

Our theoretical results suggest a negative association between legitimate private sector employment and corruption. Further research to test the empirical basis of these associations could be undertaken.

This paper discusses the results of the chapter in light of Russia's experience. We find that despite the lack of empirical evidence to provide concrete correlations between the variables, the results pass an initial test of consistency with the data, but the data are extremely sparse at present and do not permit a strong test.

This paper also raises questions about the optimal official rate of tax in the presence of an unofficial tax on wages: the optimal rate of tax will depend on corruption and on the risk of detection for shadow sector activities. A reduction in the "crowding out" of private investment through reduced government expenditure may be offset by an increase in corruption.

This paper recommends widening the tax base as the least distortionary method of improving the budget deficit. A number of policy recommendations are made,

including wage indexation for bureaucrats and ensuring that the real net wage of bureaucrats is increased *before* structural adjustment programmes are implemented.

While our results lend credence to the IMF's recent policies of "good governance" they suggest that corruption should be rooted out before structural adjustment programs are implemented minimise the corruption effect on employment, output and inflation.

Following on from the policies adopted in Russia, it would appear that an interesting antidote to the corruption problems associated with public sector wage arrears was the policy of private sector wage arrears by firms and enterprises.

Chapter 4

Optimal Monetary Policy with a Weak Tax Base: The Case of Russia

4.1 Introduction

This chapter examines the optimality of Russia's monetary policy in the 1990s and raises questions about the optimality of its current monetary policies. Specifically we focus on the consequences for inflation, output, and taxation of non-coordinated monetary and fiscal policies in an economy with an independent central bank and a weak tax base.

Kydland and Prescott (1977), Calvo (1978) and Barro and Gordon (1983) are the notable early works on which much of the modern literature of the time inconsistency of monetary policy is based. The studies showed that inflation, while costly, is usually positive in most countries. This inflation bias stems from the incentives of the monetary authorities to generate unexpected inflation to expand the economy when policy making is discretionary.

Cukierman (1990) examines various motives for policymakers for monetary expansion. These motives include employment, revenue and financial stability. One of the fundamental assumptions of the literature on time inconsistency is that the market-determined level of employment is too low, either because of labour market imperfections (such as a monopolistic trade union) which force real wages above the market-clearing level, or because of tax distortions which reduce labour supply below its market-clearing level. Alesina and Tabellini (1987), among others, concentrate on the employment motive. Barro and Gordon suggest that a higher level of employment is preferred because the objective function of the monetary authority represents the preferences of the representative private agent, while Woolley (1984) suggests that policymakers are subject to political pressures which determine their preference for a higher level of employment.

Various researchers have explored ways to reduce or eliminate the inflation bias. Rogoff (1985), Waller (1992) and Lohmann (1992) suggests that society should appoint a conservative central banker who acts in a discretionary way but is more concerned about reducing inflation than society is. Walsh (1995) uses the principal–agent approach to show that designing a contract that imposes costs on the central banker when inflation deviates from the optimal level can eliminate the inflation bias. Alesina and Tabellini (1987) suggest that where the monetary and fiscal authorities have the same objective function, binding commitments to policies can be welfare-improving, but where the authorities have different preferences then a discretionary regime may be better. This argument differs from the standard time inconsistency analysis prior to 1987 where binding commitments made by the central bank were seen as necessarily preferable to a discretionary regime.

In this paper we contribute to the debate about Russia's poor economic performance by focusing on the time inconsistency of its monetary policy. In particular we examine two distinct non-consecutive periods in the 1990s - 1992-1994, and post 17 August 1998 - when the government did not or could not use public debt for financing the budget deficit. In the first period of Russia's post-communist era, 1992-1994, it did not borrow from the public to finance its deficit (it begun borrowing in 1995 when the first GKO's were issued). In the second period (post 17th August 1998), the government could not borrow from the public because it had announced a *de facto* default on its debts (although by the year 2000, Russia was once again being given loans). In both periods in question, monetary and fiscal policies were not coordinated, the central bank was effectively independent of the fiscal authority and the tax base was weak.

Our model is a modified version of the model by Alesina and Tabellini (1987) which suggests that when policies are non-coordinated and the central bank is independent, then policymakers may be better off in a regime with discretion rather than commitments. However, we suggest that in the first period in Russia (1992-94), an underlying assumption of the model, that the central bank attaches *more* weight to inflation reduction, was violated. In fact policy was discretionary with fairly disastrous results. End-year inflation in 1992 was 2500 per cent and the economy was on the brink of hyperinflation. Repeated attempts were made to resolve the inflation problem in 1992-1994 but these attempts were undermined by the Central Bank of Russia (CBR) financing the deficit through monetary expansion and making off-budget payments and credits to commercial banks and enterprises. Skidelsky and Halligan (1996) analyse 3 failed attempts to stabilise inflation during this period. We

suggest that commitment would have been preferable to discretion under these circumstances.

In the second period in question, post-August 17 1998, after years of successfully reducing inflation, the preferences of the central bank had now altered. It had a lower preference for inflation than the fiscal authority. However, it continued to follow a *committed* policy of low inflation. According to the Alesina and Tabellini model policy should have been discretionary. In particular, "In a regime with commitments the FA is forced to choose in a worse trade-off between public spending and tax distortions, since money seigniorage is smaller than in the discretionary equilibrium. Hence, the FA reacts to the change in monetary regime by raising taxes, thereby reducing output, to compensate for part of the public loss of public spending determined by the decrease in money creation" (Alesina and Tabellini, p.626). Indeed, while the Central Bank of Russia continued to keep a tight rein on monetary policy and did not resort to widespread printing of money, real GDP slowed in the fourth quarter of 1998. According to the model output under these circumstances is lower than optimal.

We suggest that improving tax *collection* rates increases taxation revenues without the distorting influence on the labour market and output (see previous chapter of this thesis). Indeed, post August 1998, the FA in Russia has temporarily averted the raising of tax rates by raising tax *collection* rates instead. Our model predicts, however, that once tax collection rates are perfect, output under commitment will be lower than optimal.

This paper is adapted from my MSc dissertation (Engmann, 1998). However we compare different periods in Russia's transition. Engmann (1998) compares two consecutive periods - 1992-1994, and 1995-August 1998 - and does not consider the

impact of the independent central bank attaching a *lower* weight to inflation reduction. We follow Engmann (1998) by modifying Alesina and Tabellin's model to allow for a weak tax base. This captures the poor tax collection abilities of the Russian authorities because of widespread tax avoidance, tax evasion, tax deferrals and tax exemptions. The weak tax base contributes to a higher level of inflation in under both commitment and discretion. This modification helps in part to explain why, contrary to Alesina and Tabellini's prediction, taxes were not raised in the second period (post-August 17 1998) when policy was discretionary. Instead, it was tax *collection* which was improved. Another modification we adopt is to analyse our results in a graphical framework of output, inflation and taxation.

This model has a number of interesting implications. Based on our model we suggest that Russia's poor economic performance in terms of output and taxation revenues stems in part from pursuing sub-optimal monetary and fiscal policies. While its current policy of improving tax collection rates rather than increasing tax rates in a commitment to a low inflation policy is effective, our model suggests that once the tax base has been strengthened, output will be lower and taxes will be higher than optimal.

The model also has significance for a large number of governments of developing and post-communist transition economies who are facing the choice between rules and discretion when the central bank and fiscal authority have different preferences. Our results, while lending support to the IMF policy of independent professional central banks committed to a low inflation policy, suggest that this may not be optimal if the central bank and the fiscal authority do not have co-ordinated monetary and fiscal policies. In which case, only if the central bank has a lower

preference for inflation than the fiscal authority, may it optimal to have discretionary policies. We suggest that improving tax collection may be the least distortionary method of financing the budget deficit.

The rest of the chapter is organised as follows. We analyse the definition, causes and consequences of a weak tax base in section 4.2. The basic model is developed in section 4.3. Sections 4.4 and 4.5 discuss discretion and commitments respectively. Section 4.6 compares discretion with commitments. In section 4.7 we apply the model to the Russian economy for the period 1992-1994 and in section 4.8 we apply the model to the Russian economy post August 17 1998. Section 4.9 considers the limitations of our model. Section 4.10 concludes.

4.2 A Weak Tax Base

A tax base is a stock or flow of income or capital that is liable to taxation. In general, people pay taxes up to the point where the marginal cost of paying tax equals the marginal benefit of not paying tax. Individuals will choose not to pay taxes if the marginal benefits of non-payment exceed the marginal cost of payment. There are a number of ways to reduce the amount of tax an individual pays. This can be done through tax evasion, tax avoidance and tax planning. James and Nobes (1998) provide a definition of these terms. Tax evasion is the "illegal manipulation of one's affairs so as to reduce tax". Tax avoidance is the "manipulation of one's affairs within the law so as to reduce tax". Tax planning is "arranging one's affairs to take advantage of the obvious and often intended effects of tax rules in order to maximise one's after-tax returns".

Taxation gives rise to income and substitution effects. Income effects generally do not result in economic inefficiency as they merely represent a transfer of resources from the taxpayer to the government. Substitution effects affect relative prices and so distort consumers' choices between goods, or producers' choices between factors of production. This cost to the taxpayer which does not benefit the government is the excess burden of the tax. On the whole, the burden of the tax will be less in an economy with a broad tax base than in one with a narrow tax base because the collection of the tax will be spread over a larger number of goods and activities. As such there will be less distortion than if taxes were concentrated on a smaller area of the economy.

Taxation also distorts the economy by imposing costs of administering the tax system and costs of complying with the tax system.

The payment of taxes is distortionary as there are costs imposed on the private sector in complying with the requirements of the taxes. However, the activities involved in the non-payment of taxes are also distortionary: bribery, corruption, shadow economy activities, barter, political pressure and lobbying. These activities may be a source of output reduction because resources are invested in creating a gap between the nominal tax rate and the effective tax rate. Resources are invested in non-compliance up to the point where the marginal cost of non-compliance equals the marginal benefit of compliance. Hence it can be assumed that the distortion effect of unpaid taxes equals that of paid taxes.

In this thesis the main focus is on the average rate of tax. This is justified because Alesina and Tabellini, in their article, define τ as the tax rate on the total revenue of firms. Hence τ is a proportional tax: the same proportion of tax is taken from all income, however large or small. For a proportional tax, the marginal rate of

tax equals the average rate of tax. And hence in this case it can be therefore be assumed that people pay taxes up to the point where the *average* cost of paying tax equals the *average* benefit of not paying tax.

With a weak tax base the government cannot raise in tax revenue what it loses in seigniorage through reduced money supply. However, the incentive for both the fiscal authority and monetary authority to spend still remains (for political and economic reasons). As a consequence, the central bank has a preference for higher inflation at each tax rate compared to the case when the tax base is strong. Hence the economy experiences a higher rate of inflation for a given level of tax distortions and output.

The 1997 EBRD *Transition Report* recognised that Russia's shrinking tax base was caused not only by the decline in output and profits but also by the impact of tax exemptions, tax deferrals and other tax concessions. In chapter 3 of this thesis we discuss how the EBRD *Transition Report* suggests that at the end of 1996 total tax concessions amounted to an estimated Rb 163 trillion (7.2% of GDP), and tax arrears amounted to Rb 128 trillion (5.7% of GDP). There had also been an increase in tax evasion: at the beginning of 1997 about one-third of enterprises did not pay any taxes, and only 16.6% of enterprises were regularly paying taxes. If in 1996 no tax concessions were granted and there were no tax arrears, then taxation revenue could have reached 45.6% of GDP (32.7% revenue collected, 7.2% tax concessions, and 5.7% tax arrears) and would have improved the government's balances (which were minus 8.3% of GDP).[1]

From 1992-99 the Russian government deliberately based its budget on what it *should* receive rather than what it *did* receive. In this way it was able to keep

[1] This method of estimating possible taxation revenue is obviously only an approximation and should be treated with suitable caution.

spending more than the IMF would allow. The IMF insists on a balanced budget law – the government must only spend what it can receive in taxes (Camdessus, 1998). By basing the budget on what the government could receive were its tax base broader/stronger, it consistently spent more than it received in tax revenues (to soften the transition process, to influence economic performance, to aid favourable election results) and the economy experienced persistent fiscal deficits. This poor fiscal situation contributed to the August 1998 rouble crisis.

In addition to controlling government expenditure, the IMF insists that the authorities reduce money supply, make the central bank independent and make binding commitments to policy.

In 1999 the IMF said (of Russia) that, "Fundamental problems still exist, such a complicated and non-transparent tax system. The 1999 budget does not offer a solution. Based on unrealistic assumptions about inflation, exchange rate, and external finance, it serves only to highlight the government's lack of touch with reality. The only possible conclusion is that political and economic interest groups are blocking real reforms" (*Russian Economic Trends*, 1999, 1, p.2).

Our model in chapter 3 of this thesis and the model to be developed in this chapter show that improving tax collection rates may be the least distortionary method of improving the budget deficit. Indeed, since the August 1998 crisis, the Russian government has focused on improving tax collection rates and reducing tax arrears. A new Tax Code was introduced in 2000 which changed the structure of tax revenues. However, most of the benefit of the new Tax Code has been felt since 2001.

In addition, there has been a change in political pressures to incur deficits. The federal budget law for 2001, passed by the Duma on 14 December 2000, aimed to achieve a balanced budget for the first time in post-Soviet history without any drastic

expenditure cuts. Total tax arrears to the budget from the beginning of the 1990s to the end of 2001 amounted to R475 billion, although in 2001 tax arrears increased by only R11 billion compared with R86 billion growth in 2000 (RET, 2001).

Some of the improvement in the fiscal situation can be attributed to the restructuring of debt indebtedness. There has been a growth of advance VAT payments, both for technical accounting reasons and because exporters are required by make advance VAT payments to the government, which will be reimbursed in the future. This has caused controversy because although advance tax payments help reduce net tax arrears and improve the current budget situation, it means that some time in the future the budget will either not receive this money or have to pay some of it back. This could cause budget instability in the future.

4.3 The Basic Model

In the model there are three players: the central bank (CB), fiscal authority (FA) and the wage setters. Wage setters move first, setting wages one period in advance based on expectations of the price level. In the next period, the CB and FA simultaneously set money growth and taxes: price levels in excess of the previous period's expectations can result in real output movements.

One of the basic assumptions of the literature on time inconsistency is that the market-determined level of employment is too low, either because of labour market imperfections or because of tax distortions. The authorities would like to increase employment by increasing output but because of the standard specification of aggregate supply it can only do so by generating surprises.

The centralised trade union (TU) wishes to minimise the deviations of the real wage from a target v. Its loss function is:

$$V^{TU} = \frac{1}{2}\sum_{t=0}^{T} \rho^{t}\left(w_t - p_t - v\right)^2 \qquad 1 > \rho > 0 \tag{1}$$

where p = log of price level; w = log of nominal wage;

The first order condition is given by:

$$w_t = p_t^e + v \tag{2}$$

At their desired wage, union members are willing to supply any amount of labour.

The supply function is given by:

$$x_t = \alpha\left(\pi_t - \pi_t^e - \tau_t - v\right) \qquad \alpha > 0$$

where x = log of real output; τ = tax rate on the total revenue of firms; π = actual inflation rate; π^e = expected inflation rate . The supply curve shows that output depends positively on inflation surprises $\left(\pi_t - \pi_t^e\right)$ and depends negatively on distortionary taxes (τ_t) and the target wage (v).

There is no public debt, and government spending is financed either by distortionary taxes (fiscal authority) or by money creation (central bank). The government budget constraint is given by:

$$g_t = \eta\tau_t + \frac{\left(M_t - M_{t-1}\right)}{P_t X_t} \tag{3}$$

$$g_t = \eta\tau_t + \pi_t \qquad \eta < 1$$

where η is the tax collection rate. Alesina and Tabellini (1987) and Beetsma and Bovenberg (1997) set $\eta = 1$ whereas we allow a non-unitary value for η. Allowing η to differ from unity will play an important part in the forthcoming analysis: η approximates the strength of the tax base. g is set residually after

inflation and taxation are set. While the budget constraint is affected by the weak tax base, the supply function is not affected directly .[2]

The two authorities may or may not have the same preferences and may or may not act in a co-ordinated way. Policymakers wish to minimise the deviations of inflation and output from targets normalised on zero, and to minimise the deviations of public spending (g) from some positive amount, $\bar{g}$. The loss function of the CB is given by:

$$V^{CB} = \frac{1}{2}\sum_{t=0}^{T} \beta^t \left[\pi_t^2 + \mu_1 x_t^2 + \mu_2 \left(g_t - \bar{g}\right)^2\right] \qquad (4)$$

$$\mu_1 > 0, \quad \mu_2 \geq 0, \quad 0 < \beta < 1, \quad \bar{g} > 0$$

The loss function of the FA is given by:

$$V^{FA} = \frac{1}{2}\sum_{t=0}^{T} \theta^t \left[\pi_t^2 + \delta_1 x_t^2 + \delta_2 \left(g_t - \bar{g}\right)^2\right] \qquad (5)$$

$$\delta_1 > 0, \quad \delta_2 \geq 0, \quad 0 < \theta < 1,$$

If $\bar{g}$ is positive, policymakers wish, in every period, to raise an amount $\bar{g}$ of revenues in the form of either taxes or seigniorage. If v is positive, trade unions force output to be lower than the level desired by policymakers. Thus, if either $\bar{g}$ or v is positive then the FA and CB have incentives to create unexpected inflation in order to increase the level of output towards their desired level and to partially finance public expenditure.

Assume that

$\delta_i \geq \mu_i$ for $i=1,2$

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[2] In the next chapter we will consider the case where the supply function is affected by one of the causes of a weak tax base: corruption

Thus the central bank will attach a greater weight to inflation relative to output and public spending. Although the CB and FA are assumed to have the same ultimate goals, they disagree on the optimal mix of financing.

4.4 Discretion

In the discretionary regime no commitments are made to policies. The authorities are free to set or to change policies if and when they want. The game between the authorities is static and finite, hence the subgame perfect Nash equilibrium is the unique Nash equilibrium of the one-shot game. The unique Nash equilibrium of the one-shot game can be derived from the first order conditions of the FA and CB. This Nash equilibrium is time consistent because none of the players have the incentive to deviate from the equilibrium: the central bank has no incentive to generate policy surprises because the fiscal authority's choice of taxes and the trade union's choice of wages are in line with the central bank's preferences.

First we will derive the equilibrium levels of output, inflation and public spending from target levels. The Nash equilibrium is time consistent for a given tax collection rate. The authorities are assumed to have different objective functions and policies are non-coordinated. We will then extend the results by deriving a long run supply curve and the reaction functions of the fiscal authority and central bank to generate a graphical framework. We will compare the results with those with perfect tax collection.

FISCAL AUTHORITY

V^{FA} in one period: $$\frac{1}{2}\left[\pi_t^2 + \delta_1 x_t^2 + \delta_2 (g_t - \overline{g})^2\right] \qquad (6)$$

Minimising V^{FA} subject to the supply curve and the government's budget constraint, i.e.

$$\frac{\partial V^{FA}}{\partial \tau} \quad \text{subject to} \qquad x_t = \alpha(\pi_t - \pi_t^e - \tau_t - v) \tag{7}$$

and

$$g_t = \eta\tau_t + \pi_t \tag{8}$$

Therefore, V^{FA} in one period:

$$\frac{1}{2}\left[\pi_t^2 + \delta_1\alpha^2(\pi_t - \pi_t^e - \tau_t - v)^2 + \delta_2(\eta\tau_t + \pi_t - \bar{g})^2\right]$$

$$\frac{\partial V^{FA}}{\partial \tau} \Big/_{\pi,v} = \frac{1}{2}\left[-2\delta_1\alpha^2(\pi_t - \pi_t^e - \tau_t - v) + 2\eta\delta_2(\eta\tau_t + \pi_t - \bar{g})\right]$$

$$= -\delta_1\alpha x_t + \eta\delta_2(g - \bar{g}) = 0$$

$$x^{dw} = -\frac{\eta\delta_2}{\alpha\delta_1}(\bar{g} - g^{dw}) \tag{9}$$

From (9), $x^{dw} < 0$. The equilibrium level of output is below its target, zero. The higher is $\bar{g}$, the greater the need for τ (given π, v) and the lower is x. g and x are directly associated because both rely on seigniorage.

Comparing with the case where $\eta = 1$, that is, tax collection is perfect, $x^{dw} > x^{d}$, the equilibrium level of output is higher under a weak tax base.

CENTRAL BANK

V^{CB} in one period: $\frac{1}{2}\left[\pi_t^2 + \mu_1 x_t^2 + \mu_2(g_t - \bar{g})^2\right]$

$\frac{\partial V^{CB}}{\partial \pi}$ subject to $x_t = \alpha(\pi_t - \pi_t^e - \tau_t - v)$ and $g_t = \eta\tau_t + \pi_t$

Therefore, V^{CB} in one period:

$$\frac{1}{2}\left[\pi_t^2 + \mu_1\alpha^2\left(\pi_t - \pi_t^e - \tau_t - v\right)^2 + \mu_2(\eta\tau_t + \pi_t - \bar{g})^2\right]$$

$$\frac{\partial V^{CB}}{\partial \pi} \Big/_{\tau, v} = \frac{1}{2}\left[2\pi_t + 2\mu_1\alpha^2\left(\pi_t - \pi_t^e - \tau_t - v\right) + 2\mu_2(\eta\tau_t + \pi_t - \bar{g})\right]$$

$$= \pi_t + \mu_1\alpha x_t + \mu_2\left(g - \bar{g}\right) = 0$$

Using (9), $$\pi^{dw} = \frac{\mu_1\eta\delta_2 + \mu_2\delta_1}{\delta_1}\left(\bar{g} - g^{dw}\right) \qquad (10)$$

From (10), $\pi^{dw} > 0$. The equilibrium rate of inflation is positive (above its zero target level) and positively related to $\bar{g}$. The higher is $\bar{g}$ the higher is inflation (seigniorage) to finance public spending.

Comparing with the case where $\eta = 1$, that is, tax collection is perfect, $\pi_{dw} > \pi_d$, the equilibrium rate of inflation is higher under a weak tax base.

GOVERNMENT EXPENDITURE

From (9), $$-\delta_1\alpha x_t + \delta_2\eta\left(g - \bar{g}\right) = 0$$

Hence $$\left(\bar{g} - g\right) = -\frac{\alpha\delta_1}{\delta_2\eta}x_t$$

An expression for x_t will be generated in terms of $\pi, \bar{g}$, and v and then substituted back into the expression for $\left(\bar{g} - g\right)$.

From (7) $$x_t = \alpha\left(-\tau - v\right) \qquad \text{given } \pi = \pi^e$$

Using (8), $$x_t = \alpha\left(\frac{\pi}{\eta} - \frac{g}{\eta} - v\right)$$

However, from (9), $g_t = \frac{\delta_1 \alpha x_t}{\delta_2 \eta} + \bar{g}$

therefore $x_t = \alpha\left(\frac{\pi_t}{\eta} - \frac{\delta_1 \alpha x_t}{\delta_2 \eta^2} - \frac{\bar{g}}{\eta} - v\right)$

$$x_t\left(\frac{\delta_2\eta^2 + \delta_1\alpha^2}{\alpha\delta_2\eta^2}\right) = \frac{1}{\eta}\left(\pi_t - \left(\bar{g} + \eta v\right)\right)$$

$$x_t = \frac{\alpha\delta_2\eta}{\delta_2\eta^2 + \delta_1\alpha^2}\left(\pi_t - \left(\bar{g} + \eta v\right)\right)$$

Substituting x_t calculated above into the expression for $\bar{g} - g$.

$$\left(\bar{g} - g\right) = -\frac{\alpha\delta_1}{\delta_2\eta}\left[\frac{\alpha\delta_2\eta}{\delta_2\eta^2 + \delta_1\alpha^2}\left(\pi_t - \left(\bar{g} + \eta v\right)\right)\right]$$

Using the equilibrium rate of inflation calculated in equation (10):

$$\left(\bar{g} - g^{dw}\right) = -\frac{\alpha\delta_1}{\delta_2\eta}\left[\frac{\alpha\delta_2\eta}{\delta_2\eta^2 + \delta_1\alpha^2}\left(\frac{\mu_1\delta_2\eta + \mu_2\delta_1}{\delta_1}\left(\bar{g} - g^d\right) - \left(\bar{g} + \eta v\right)\right)\right]$$

$$\left(\bar{g} - g^{dw}\right)\left[1 + \frac{\alpha^2}{\delta_2\eta^2 + \delta_1\alpha^2}\left(\mu_1\delta_2\eta + \mu_2\delta_1\right)\right] = \frac{\alpha^2\delta_1}{\delta_2\eta^2 + \delta_1\alpha^2}\left(\bar{g} + \eta v\right)$$

$$\left(\bar{g} - g^{dw}\right)\left[\frac{\delta_2\eta^2 + \delta_1\alpha^2 + \alpha^2\mu_1\delta_2\eta + \alpha^2\mu_2\delta_1}{\delta_2\eta + \delta_1\alpha^2}\right] = \frac{\alpha^2\delta_1}{\delta_2\eta^2 + \delta_1\alpha^2}\left(\bar{g} + \eta v\right)$$

$$\left(\bar{g} - g^{dw}\right) = \frac{\alpha^2\delta_1\left(\bar{g} + \eta v\right)}{\alpha^2\delta_1\left(1 + \mu_2\right) + \delta_2\eta\left(\eta + \alpha^2\mu_1\right)} \qquad (11)$$

The larger are $\bar{g}$ and v, the further away is g from its target. From (9) and (10), the higher is $\bar{g}$, the greater is output and the higher is inflation (respectively).

By simulation it can be deduced that government expenditure is less when tax collection is weak ($g^{dw} < g^d$). This intuitively makes sense. With less tax revenue coming in, the government has less to spend (for a given rate of inflation) and

government expenditure is further away from its target level, making it worse off (it aims to minimise deviations of output of g from $\bar{g}$) compared to the perfect tax collection case.

Extending our results to allow graphical analysis involves deriving the long run supply curve and the reaction functions of the authorities in the inflation-output space and the inflation-tax space.

INFLATION-OUTPUT SPACE

Firstly the long run supply curve will be derived with output as a function of inflation. To generate the "no fooling" long run supply curve, assume $\pi = \pi^e$

From (7) $\quad x_t = \alpha(-\tau_t - v)$

Using (8), $\quad x_t = \alpha\left(\frac{\pi_t}{\eta} - \frac{g_t}{\eta} - v\right)$

From (9), $\quad g_t = \frac{\delta_1 \alpha x_t}{\eta\delta_2} + \bar{g}$

$$x_t = \alpha\left(\frac{\pi_t}{\eta} - \frac{\delta_1 \alpha x_t}{\eta^2\delta_2} - \frac{\bar{g}}{\eta} - v\right)$$

$$x_t\left(\frac{\delta_2\eta^2 + \delta_1\alpha^2}{\alpha\delta_2\eta^2}\right) = \frac{1}{\eta}\left(\pi_t - \bar{g} - \eta v\right)$$

"No fooling" Supply Curve: $\quad x_t = \frac{\alpha\delta_2\eta}{\delta_2\eta^2 + \delta_1\alpha^2}\left(\pi_t - \bar{g} - \eta v\right)$ (12)

The slope of the "no fooling" supply curve is positively related to inflation and is non-vertical: the more g is financed by seigniorage, the less distortionary is taxation and the higher is output. The position of the no fooling supply curve depends on the value of η: the smaller is η the further away the curve from the perfect tax collection case.

The *short run* central bank's reaction function will now be derived with inflation as a function of output. To generate the central bank's reaction function, (10) is used:

$$\pi_t = -\mu_1 \alpha x_t - \mu_2 \left(g_t - \bar{g} \right)$$

$$\pi_t = -\mu_1 \alpha x_t - \mu_2 \left(\frac{\delta_1 \alpha x_t}{\delta_2 \eta} + \bar{g} - \bar{g} \right)$$

CB's reaction function: $$\pi_t = -\alpha \left(\mu_1 + \frac{\delta_1 \mu_2}{\delta_2 \eta} \right) x_t \qquad (13)$$

The reaction function is negatively sloping. The lower is output, the higher the incentive to generate surprise inflation.

INFLATION-TAX SPACE

The fiscal authority's reaction function and the central bank's reaction function are derived below. In both cases inflation is a function of taxation. To generate the FA's reaction function, (9) is used:

$$x_t = -\frac{\eta \delta_2}{\alpha \delta_1} \left(\bar{g} - g \right)$$

$$\delta_1 \alpha x_t = \eta \delta_2 \left(g - \bar{g} \right)$$

$$\delta_1 \alpha^2 \left(-\tau - v \right) = \eta \delta_2 \left(\eta \tau + \pi - \bar{g} \right) \qquad \text{given } \pi = \pi^e$$

$$\pi_t = \frac{\delta_1 \alpha^2}{\eta \delta_2} \left(-\tau - v \right) - \eta \tau + \bar{g}$$

FA's reaction function: $$\pi_t = -\left(\frac{\delta_1 \alpha^2}{\delta_2 \eta} + \eta \right) \tau + \bar{g} - \frac{\delta_1 \alpha^2}{\delta_2 \eta} v \qquad (14)$$

Inflation is negatively related to taxation. The lower the central bank sets inflation, the higher the FA sets distortionary taxes to finance public spending and the lower is output. The weak tax base affects both the slope and the intercepts of the FA reaction function.

To generate the central bank's reaction function, (10) is used:

$$\pi_t = -\mu_1 \alpha x_t - \mu_2 \left(\eta\tau + \pi_t - \bar{g}\right)$$

$$\pi_t (1+\mu_2) = -\mu_1 \alpha^2 (-\tau - v) - \mu_2 \left(\eta\tau - \bar{g}\right)$$

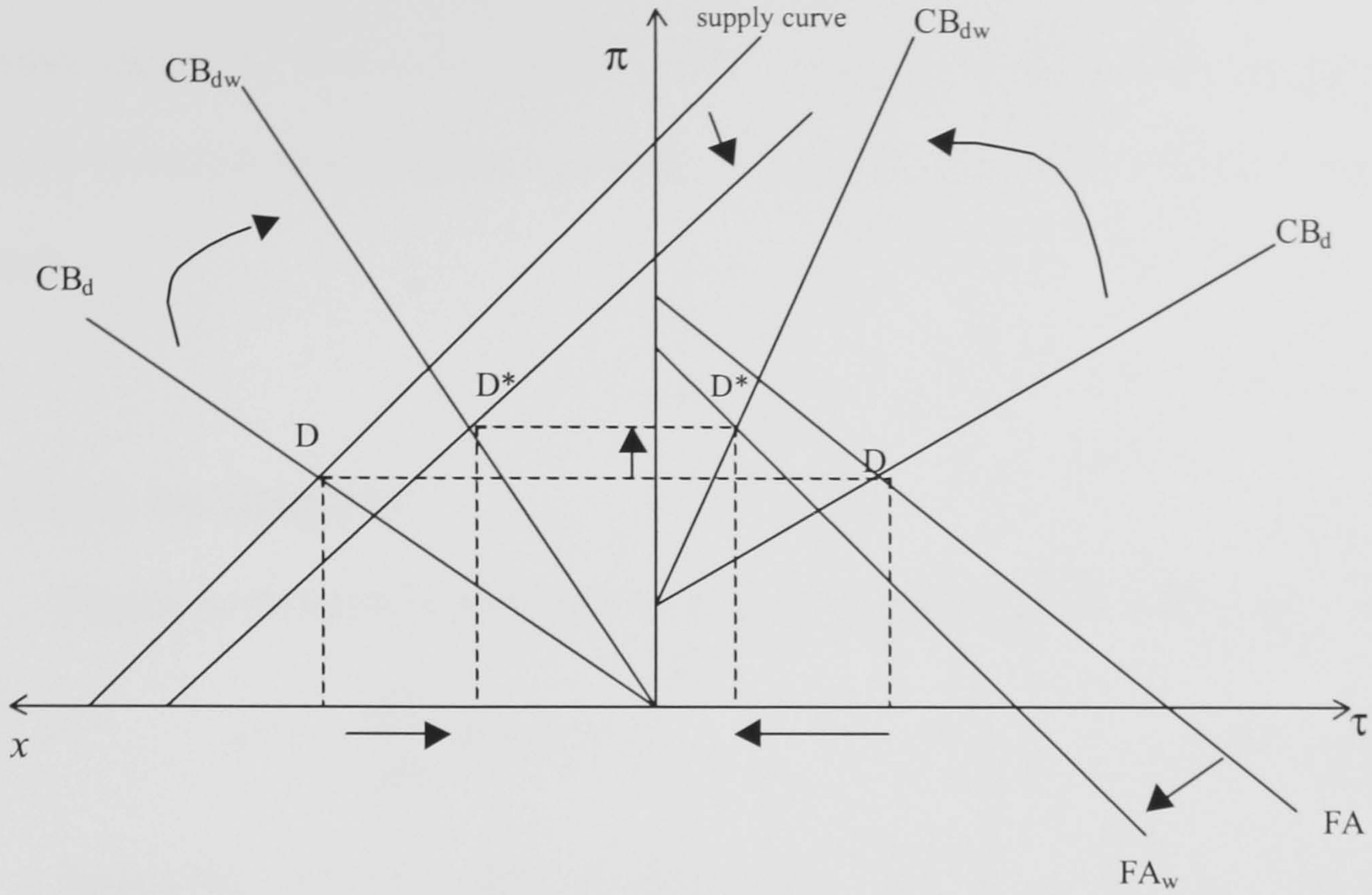
$$\pi_t (1+\mu_2) = -\tau\left(\eta\mu_2 - \mu_1\alpha^2\right) + \mu_1\alpha^2 v + \mu_2 \bar{g}$$

CB's reaction function: $$\pi_t = \frac{1}{1+\mu_2}\left[\left(\mu_1\alpha^2 - \mu_2\eta\right)\tau + \mu_1\alpha^2 v + \mu_2 \bar{g}\right] \qquad (15)$$

Inflation is positively related to taxation. The higher are the distortionary taxes set by the FA, the lower is output, and the higher the CB's incentive to generate unexpected inflation to raise output (from (7), output is negatively related to taxes). The weak tax base affects the slope of the CB reaction function: it is steeper. That is, inflation is higher at each level of the nominal tax rate as the *effective* rate of tax is lower.

Using the curves we have derived for the long run supply function and the reaction functions of the authorities in the inflation-output space and the inflation-tax space we now analyse, graphically, the equilibrium under discretion (with and without perfect tax collection).

Figure 4.1: Equilibrium under discretion – comparing weak and perfect tax collection



In summary, in comparison to the perfect tax collection case,

$$x^{dw} > x^{d};\ \pi^{dw} > \pi^{d};\ g^{dw} < g^{d};\ \tau^{dw} < \tau^{d}$$

The loss of government expenditure from lower tax rates is partly compensated by higher inflation rates. However, the lower tax rates and the higher inflation rates have a positive effect on output.

4.5 Commitment

The central bank enters into **a binding commitment** about its policy before the trade union sets wages. The central bank sets a rate of inflation and then the trade union sets wages in line with the inflation rate set by the bank. In this way there are no inflation surprises, and because the central bank does not renege on its promises, a time inconsistent policy of low inflation may be sustained. In other words, the central bank and the trade union cooperate to achieve a low inflation and time inconsistent equilibrium.

Binding commitments are modelled by imposing the condition that $\pi = \pi^e$ before taking the first order condition of the objective function of the central bank. Under discretion this condition was imposed *after* the first order conditions had been taken.

FISCAL AUTHORITY

Equations (16) and (17) are derived in a similar way to equations (9) and (10).

$$x^{cw} = -\frac{\eta\delta_2}{\alpha\delta_1}\left(\bar{g} - g^{cw}\right) \tag{16}$$

From (16), $x^{cw} < 0$. That is, the optimal level of output is less than zero. Compared to the perfect tax collection situation, $x^{cw} > x^{c}$, the equilibrium level of output is greater under a weak tax base.

CENTRAL BANK

V^{CB} in one period: $\frac{1}{2}\left[\pi_t^2 + \mu_1\alpha^2(-\tau_t - v)^2 + \mu_2(\eta\tau_t + \pi_t - \bar{g})^2\right]$

Imposing $\pi = \pi^e$ before taking the first order conditions rather than after, implies minimising:

$\frac{\partial V^{CB}}{\partial \pi}$ subject to $x_t = \alpha(-\tau_t - v)$ and $g_t = \eta\tau_t + \pi_t$

Therefore, V^{CB} in one period: $\frac{1}{2}\left[\pi_t^2 + \mu_1\alpha^2(-\tau_t - v)^2 + \mu_2(\eta\tau_t + \pi_t - \bar{g})^2\right]$

$$\frac{\partial V^{CB}}{\partial \pi} \Big/_{\tau, v} = \frac{1}{2}\left[2\pi_t + 2\mu_2(\eta\tau_t + \pi_t - \bar{g})\right] = 0$$

$$\pi^{cw} = \mu_2\left(\bar{g} - g^{cw}\right) \tag{17}$$

From (17), $\pi^{cw} > 0$. Compared to the perfect tax collection situation, $\pi^{cw} > \pi^{c}$.

The equilibrium level of inflation is greater under a weak tax base.

GOVERNMENT EXPENDITURE

$$\bar{g} - g^{cw} = \frac{\alpha^2 \delta_1 (\bar{g} + \eta v)}{\alpha^2 \delta_1 (1 + \mu_2) + \delta_2 \eta^2} \tag{18}$$

By simulation it can be deduced that government expenditure is lower under a weak tax base, $g^{cw} < g^{c}$.

The long run supply curve and the reaction functions of the central bank and fiscal authorities are now derived in the inflation-output and the inflation-tax space.

INFLATION-OUTPUT SPACE

The long run supply curve is identical to that under discretion and generated by an identical method.

CB's reaction function: $$\pi_t = -\mu_2 \left(\frac{\delta_1 \alpha}{\eta \delta_2} \right) x_t \tag{19}$$

The central bank is committed to lower inflation. The slope of the curve is steeper for the weak tax base than for a perfect tax base. That is, for a given level of output more inflation is required.

INFLATION-TAX SPACE

This is derived using a similar method to that for discretion

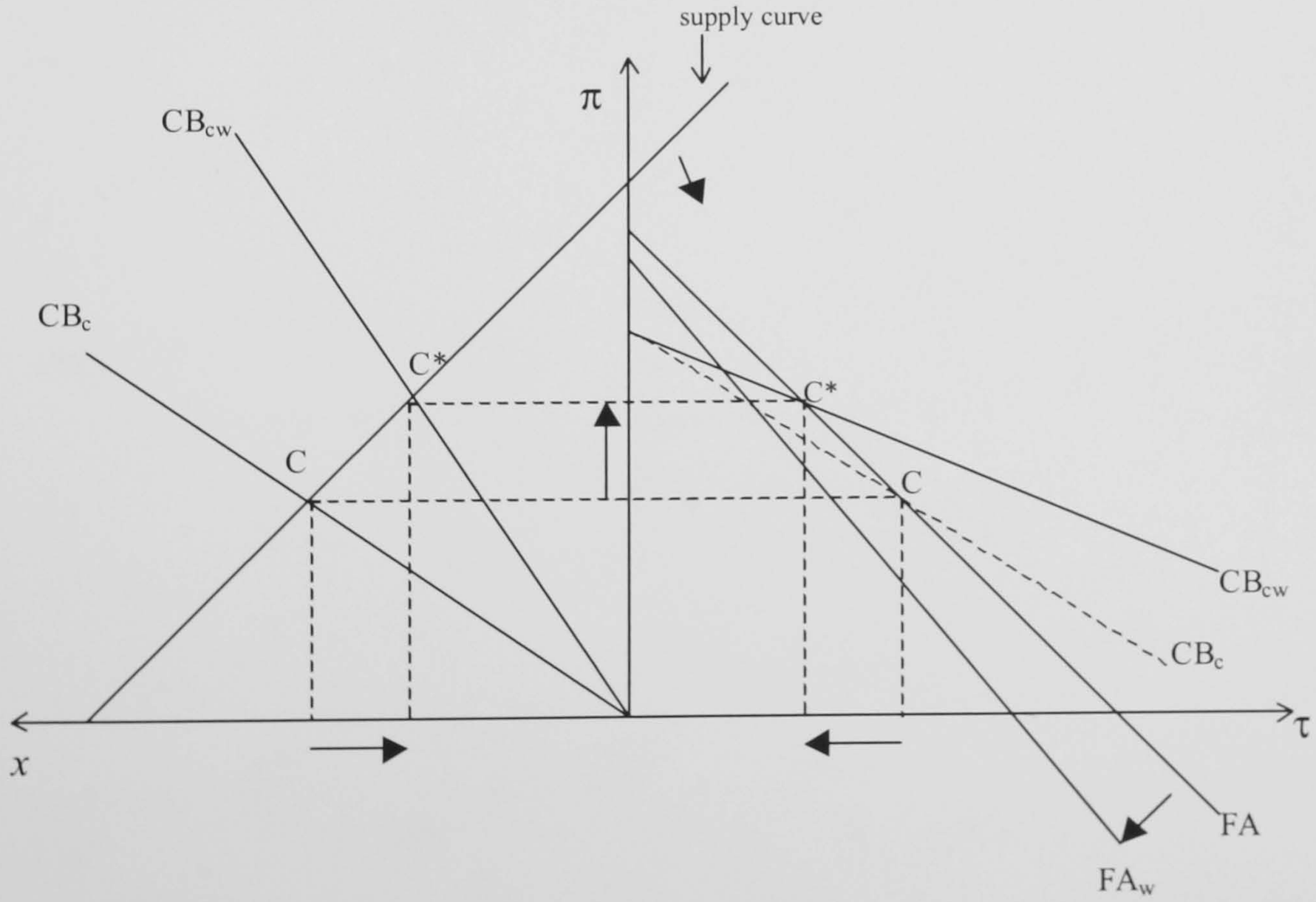
FA's reaction function: $$\pi_t = -\left(\frac{\alpha^2 \delta_1}{\delta_2 \eta} + \eta \right) \tau + \bar{g} - \frac{\alpha^2 \delta_1}{\delta_2} v \tag{20}$$

The FA's reaction function is the same under commitment and discretion, although compared to the perfect tax collection case, the FA's reaction function under a weak tax base is steeper and shifted inwards.

CB's reaction function: $$\pi_t = \frac{\mu_2}{1+\mu_2}\left(\bar{g} - \eta\tau\right) \qquad (21)$$

The rate of inflation is negatively related to the rate of distortionary taxation. The slope of the curve is less steep when the tax base is weak. That is, for a given level of distortionary taxation a higher level of inflation is required as the effective rate of tax is lower.

Figure 4.2: Equilibrium under commitment – comparing weak and perfect tax collection



In summary, in comparison to the perfect tax collection case,

$$x^{cw} > x^{c};\ \pi^{cw} > \pi^{c};\ g^{cw} < g^{c};\ \tau^{cw} < \tau^{c}$$

The loss of government expenditure from lower tax rates is partly compensated by higher inflation rates. However, the lower tax rates and the higher inflation rates have a positive effect on output.

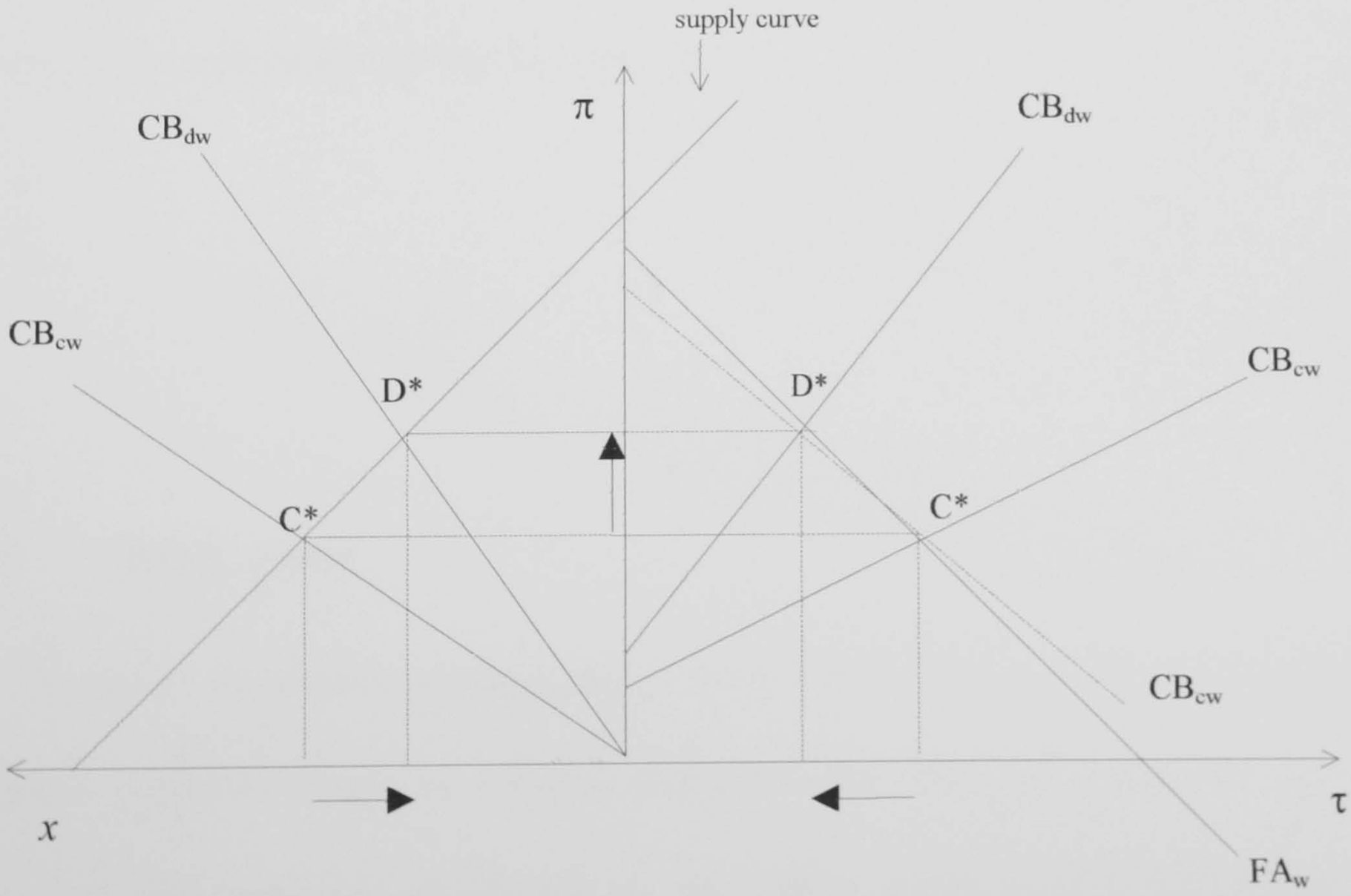
4.6 Comparison

The results of our model are as follows. Output, inflation and government expenditure are higher under discretion than commitment. Taxes are lower. Algebraically,

$$x^{dw} > x^{cw};\ \pi^{dw} > \pi^{cw};\ g^{dw} < g^{cw};\ \tau^{dw} < \tau^{cw}$$

We show the results graphically in the diagram below.

Figure 4.3: Comparing discretion with commitment under a weak tax base



From their objective functions, both players care about inflation, output, and the deviations of government expenditure from its target $\bar{g}$. According to Alesina and Tabellini, as preferences are different and actions are non-coordinated, discretion may

be preferable to commitment. This is because in a regime with commitments the FA is faced with a decrease in money seigniorage, and consequently a worse trade-off between public spending and tax distortions. The FA is forced to raise taxes (which reduces output) to compensate for part of the loss of public spending. In the diagram above, the discretionary equilibrium may be pareto dominant when at least one player, the FA, is better off when compared to commitment because the gains from increased output, lower distortionary taxation and higher government expenditure outweigh the costs of extra inflation, and the CB is no worse off, as it may well attach a sufficient weight to output (μ_1). The trade union is indifferent between the two regimes even though it may be worse off under commitment if it cares about employment.

The introduction of a weak tax base does not significantly change their conclusion, although the optimal level of inflation is higher.

4.7 1992-1994

A crucial assumption of the model in the previous section is that the central bank attaches a greater weight to inflation reduction than the fiscal authority ($\delta_i \geq \mu_i$). However, the outcome in Russia in the early 1990s clearly contradicts this assumption: the central bank attached less weight to inflation reduction than the fiscal authority ($\delta_i \leq \mu_i$). Skidelsky and Halligan (1996) analyse 3 attempts by the Russian authorities during 1992-1994 to bring inflation under control:

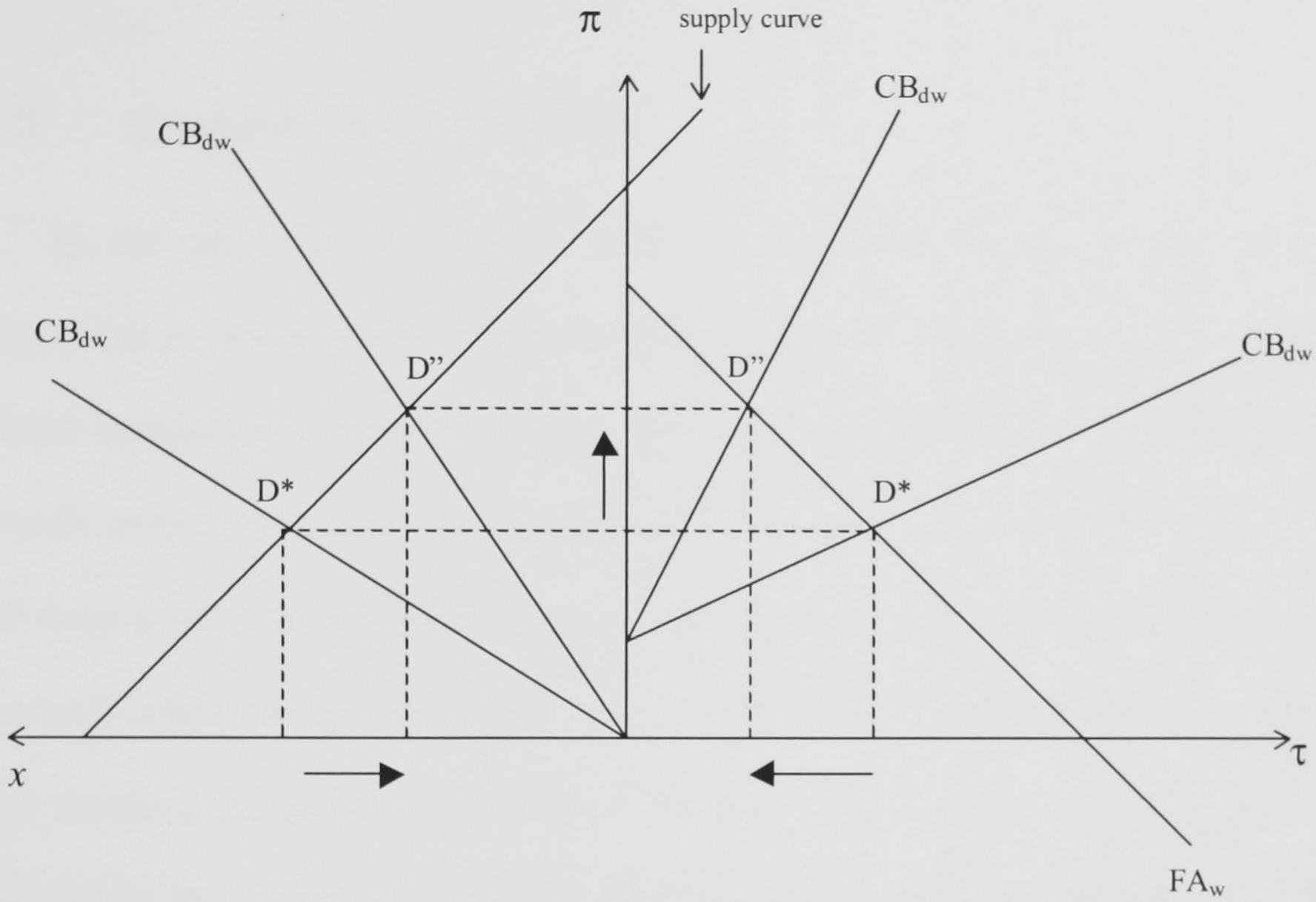
- In 1992, Gaidar tried to reduced inflation by cutting the budget deficit through tax increases and spending cuts
- In 1993, Fedorov embarked on a programme of cutting off-budget CBR credits to public and private enterprises and to former Soviet republics. However high inflationary expectations and continued credits to the agricultural sector undermined his policies
- In 1994, Chernomyrdin introduced a new interest rate policy to stem the flow of credit to commercial banks. Monetary financing of the budget deficit continued, and the ruble crash in October 1994 marked an end to this inflation reduction period.

In our model, an increase in μ_1 and/ or μ_2 for a given δ_i such that $\delta_i \leq \mu_i$ for $i=1,2$, can be interpreted as the appointment of an independent central bank that has a particular liking for inflation. For instance, this may occur, as is the case of Russia, where the CB rather than the FA incorporates the true social preferences. Taking the partial derivatives of equations (9), (10), and (11) with respect to μ_1 and μ_2 - unnecessary to show here - shows that an increase in μ_1 and μ_2 results in higher inflation, higher output, higher government expenditure and lower taxes.

Intuitively, if the CB attaches a greater weight to output (μ_1) this increases the time consistent rate of inflation since it increases the CB's incentive to generate surprise inflation. However, this induces the FA to lower tax revenue (in Russia's case through widespread tax exemptions and deferrals) with a positive impact on output. If the CB attaches a greater weight to public expenditures (μ_2) then it is more willing to finance public spending by means of money creation (which the CBR did in

1992-1994). Thus the authorities are collecting too much revenue in the form of inflation and too little in the form of taxation. This is shown diagrammatically below.

Figure 4.4: Equilibrium in 1992-1994 (D") under discretion



This analysis sheds light on the large output fall experienced by Russia during this period. It suggests that in the period 1992-94 in Russia when real GDP growth averaged about minus 12 per cent, the fall in output would have been even greater if the central bank had been averse to inflation. That is, things were not as bad as they could have been. However the smaller drop in output was far outweighed by the loss in terms of three-digit inflation and reduced taxation revenues.

In the period 1995-August 1998, with the political support of the Duma and financial support from the IMF, the CBR successfully committed to a low inflation policy and the preferences of the CB and FA were broadly identical. By 1998 the CB's preferences had been altered and it had effectively become inflation-averse.

Next, we argue that in the aftermath of August 17 1998 when Russia basically defaulted on its public and international debt, the CBR's continued commitment to a low inflation policy was perhaps too harsh in terms of the cost to output and its preferences once again diverged from those of the FA.

4.8 August 17 1998-1999

In the aftermath of August 1998, the Russian authorities found it nearly impossible to borrow money and the CBR, now under more responsible and inflation-averse management, resisted attempts for monetary expansion. *Russian Economic Trends* neatly summarises the problem: "The Russian government is effectively cut off from sources of non-inflationary financing for its programs. It has virtually no access to either foreign or domestic capital markets after the default on the rouble debt and devaluation, and they are likely to remain closed until a credible program of revitalising the economy is adopted. It is not obvious whether the IMF will provide loans to Russia next year. Nevertheless, the state needs funds to finance its budget deficit, its arrears and its banking sector restructuring..... The stock of arrears owed by the government has continued to increase. Running up arrears has been one measure used by the govt to finance de-facto budgetary gaps. For want of more realistic estimates of tax collection and/ or more realistic spending promises, the pressure on the govt to continue using arrears for its budgetary needs will remain, and inflation will make it even more attractive to delay payments. State sector wage arrears amounted to R22 billion by the end of October (excluding arrears to the military), and other overdue obligations of the federal budget alone amount to several times this figure. Eventually these debts will have to be paid off." *(Russian Economic Trends*, 1998, 4, p.20).

Alesina and Tabellini suggest that when the CB and FA have different preferences, for $\delta_i \geq \mu_i$, then both policymakers could be worse off in a regime with commitments than in a discretionary regime. Their reasoning is as follows. If policymakers assign different weights to their objectives, then in a regime with commitments the FA is forced to choose a worse trade-off between public spending and distortionary taxes, since money seigniorage is smaller than in a discretionary regime. The FA is forced to raise taxes to compensate for the loss in public spending from reduced seigniorage, and this negatively affects output. If the gain from reduced inflation far outweighs the loss in output and public spending then the FA is made worse off under a regime with commitments. This is particularly the case when there is large difference between the weights attaches to public expenditures. That is, $\delta_i - \mu_i$ is large. The CB may even be worse off itself under a discretionary regime if it attaches a large weight to output (μ_1). The trade union (TU) is indifferent between the two regimes even though it may be worse off under commitment if it cares about employment. Thus a committed central bank may bring about a Pareto deterioration if none of the players are better off and at least one player is worse off.

Indeed in the aftermath of August 17 1998, the CBR is maintained a fairly tight rein on inflation. However, like the Alesina and Tabellini model, our model suggests that even with a weak tax base it may perhaps be preferable for policy to be discretionary if at least one of the players are better off and neither is worse off. It appears that Russia has moved from one sub-optimal position in 1992-94 to another post August 17 1998. In diagram 5.3 the economy is at C* instead of D*. Output would be higher under a discretionary regime.

The FA in Russia has, as the model suggests, increased taxation revenues, but not by increasing the tax rate. Instead the FA has increased the tax collection rate. This

may well have averted a large fall in output. This model suggests however, that once tax collection is as perfect as it could be, tax rates will be increased if the central bank remains committed to a low inflation policy.

In addition, the Russian FA managed to maintain high public expenditures by running up wage and payment arrears but this policy is gradually being reversed and eventually the FA will have to reduce public spending if the low rate of inflation continues. Thus government expenditure may be brought in line with taxation revenues. In which case it may be in everyone's interest if the CBR sets policy in a discretionary manner, especially now that the lessons from Russia's failed attempts at inflation reduction in 1992-94, as analysed by Skidelsky and Halligan (1996), have been learned.

4.9 Limitations of the Model

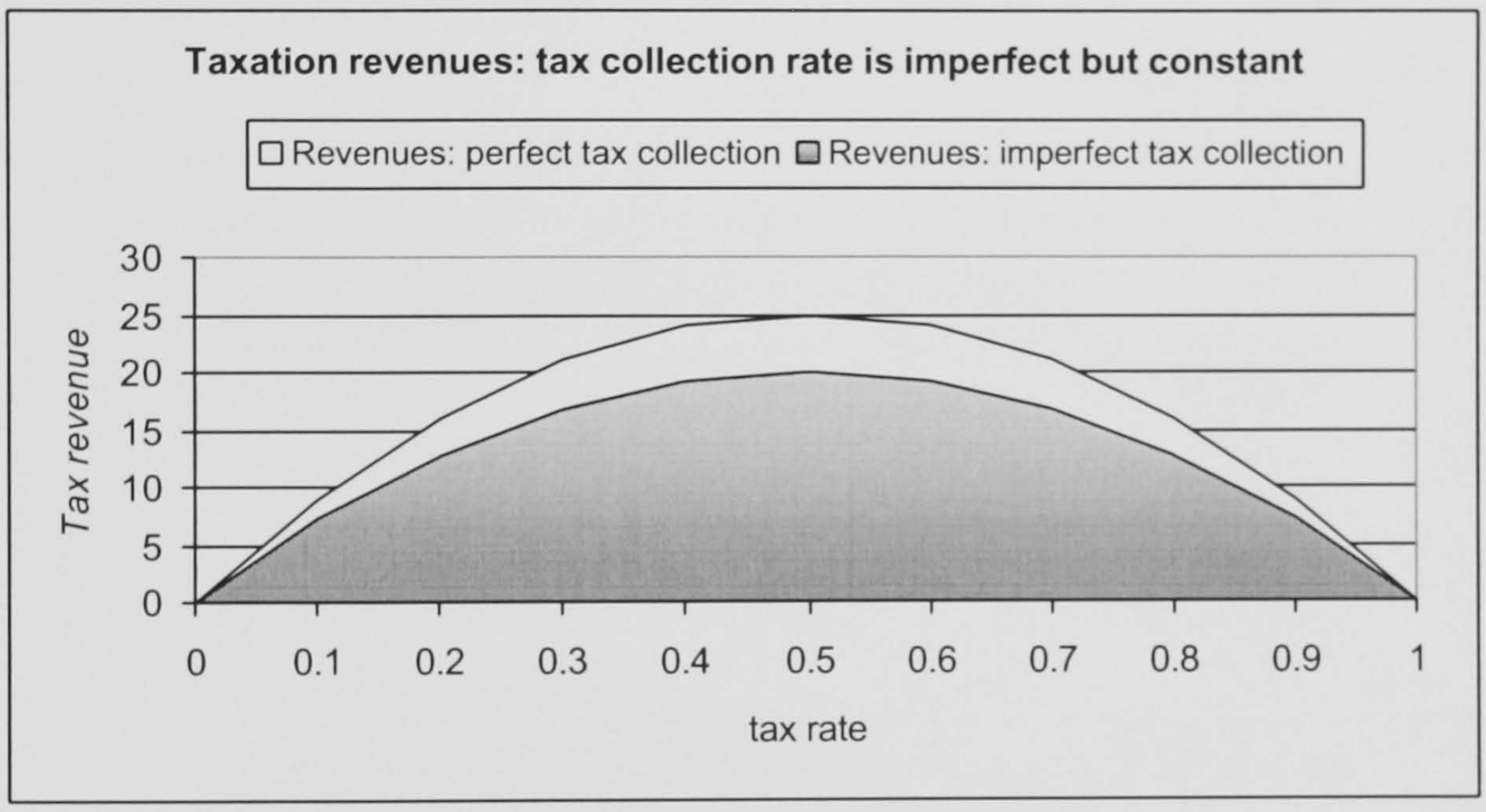
The criticisms levied at Alesina and Tabellini's original model also hold here. Most notably our model is seriously restrictive because we do not consider debt which has played a key role in Russia's economic crises.

We have assumed that the weak tax collection ability of the authorities has a positive impact on output, if any. However this impact very much depends on the reasons *why* tax collection is weak. If it is weak purely because the government allows widespread tax exemptions and tax deferrals or there is a large barter economy, then it is likely that output will be unaffected (or even positively affected). However if tax collection is weak because the bureaucrats are corrupt, as in Chapter 4 of this thesis, then output may be *negatively* affected by a fall in the tax collection rate. In

the next chapter of this thesis we will develop a model in which one of the causes of a weak tax base, corruption, is explicitly incorporated in the aggregate supply function.

We have also assumed that the tax collection rate is constant and does not vary with any macroeconomic variables. The impact on tax revenues of a *constant* tax collection rate is shown in the diagram below.

Figure 4.5: Taxation revenues where tax collection is imperfect but constant



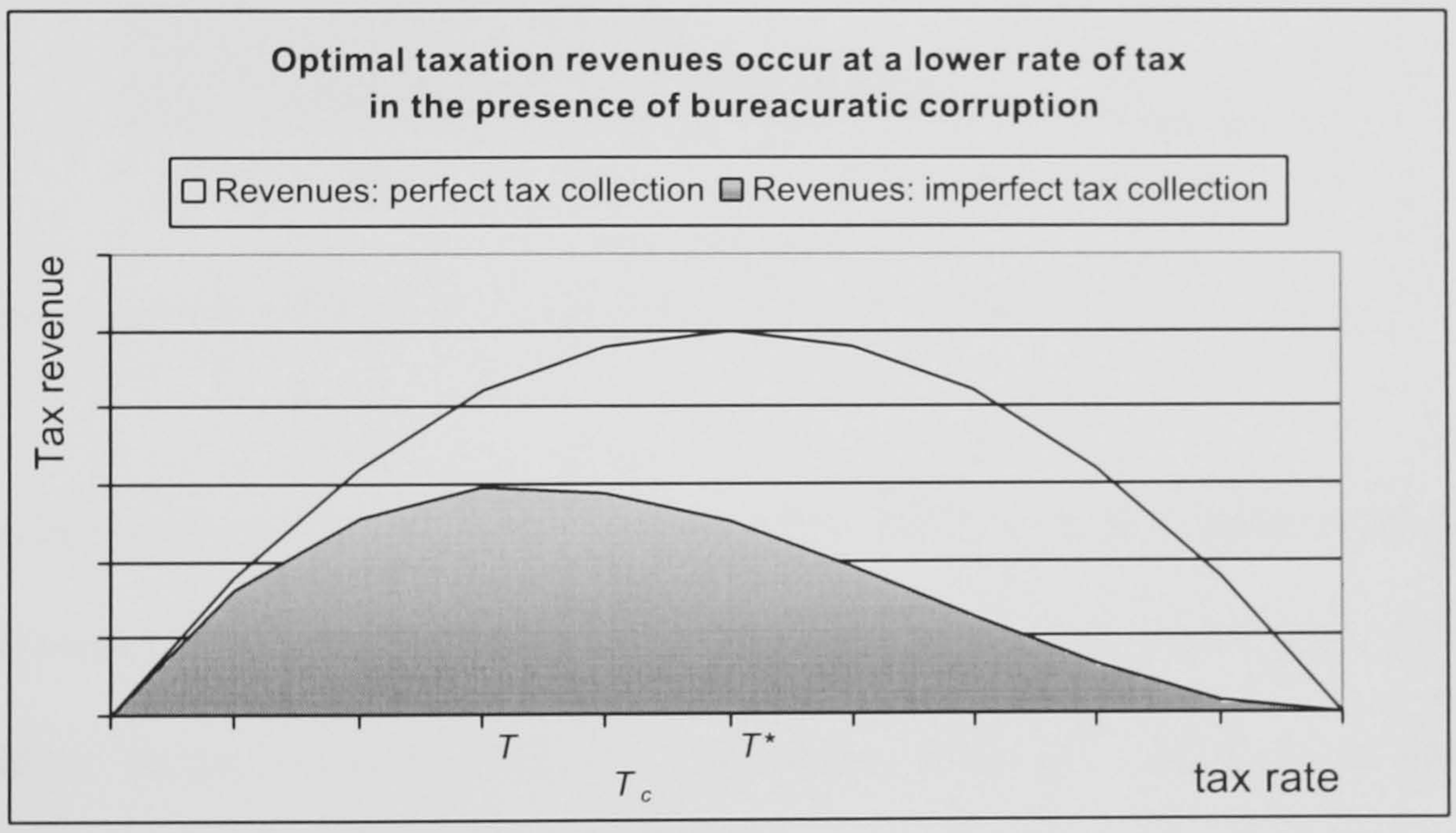
However, according to the model developed in Chapter 3 of this thesis, the tax collection rate *may* vary with the rate of taxation in an economy with a corrupt bureaucracy as corrupt bureaucrats alter their bribe-taking activities in response to lower net wages.

Tax base varies with the rate of taxation

Suppose that $\eta_t = g(\tau_t);\ g' < 0,\ g'' < 0$. There is a large theoretical and empirical literature that shows that an increase in taxation results in an increase in shadow sector activities -for example Waud (1986) and Feige (1989). The impact on taxation revenues depends on whether the tax rate is greater or less than the optimal rate of tax.

In Chapter 4 we make an additional point about taxation in an economy with a corrupt bureaucracy. An increase in taxation will result in an increase in corruption which further reduces legitimate private sector activity and results in a decrease in taxation revenues at each rate of tax. Taxation revenues are maximised when $\tau + \tau_{BR} = \tau^*$, where τ^* is the optimal rate of tax and τ_{BR} is the corruption tax. Thus taxation revenues will rise as long as $\tau \leq \tau^* - \tau_{BR}$. Diagram 5.7 shows the case where the inflation rate is constant, but the tax collection rate falls as the tax rate increases.

Figure 4.6: Taxation revenues with tax collection rate that varies with the tax rate



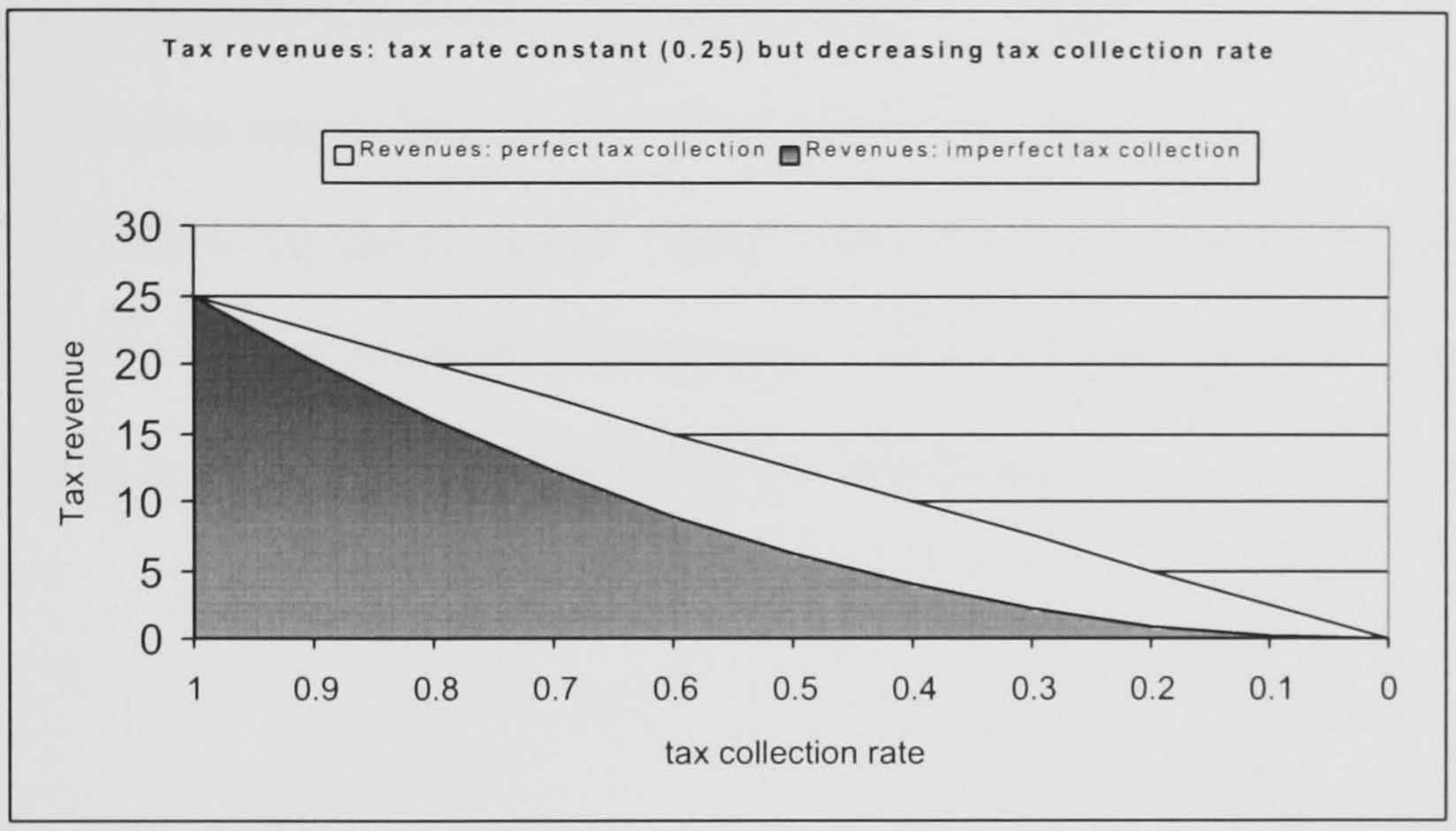
In which case it is commitment to low inflation which is Pareto inferior as it involves an even greater fall in output when the FA is forced to raise taxes to finance the budget deficit. If the CB cares about output then both players are made worse off.

Tax base varies with the rate of inflation

Suppose $\eta_t = f(\pi_t);\ f' < 0,\ f'' < 0$. An increase in inflation in an inadequately indexed economy, as is the case with Russia, results in an increase in corruption and shadow economy activities which negatively affects taxation revenues. Diagram 5.6

shows the case where the tax rate is constant, but increasing inflation results in falling tax collection.

Figure 4.7: Taxation revenues with a constant tax rate and decreasing tax collection rate



In the literature on time inconsistency positive inflation is associated with rising output. However, in an inadequately indexed economy, rising inflation may result in rising shadow sector activities and/ or corruption. This will result in a *fall* in registered output. That is, inflation is negatively related to output (Phillips curve is upward sloping). In which case, commitment to low inflation may be Pareto superior even if authorities have different preferences, because higher inflation will result in lower output.

In this section we have suggested that the tax collection rate may vary and that the reasons why it varies affects the time consistency of monetary policy.

In an economy with a corrupt bureaucracy, an increase in the rate of tax may result in a fall in output because of an associated increase in corruption as bureaucrats

seek to supplement the fall in their real official net wages. In which case, discretion is even more preferable to commitment when the FA and CB have different preferences as it involves a lower rate of tax and consequently a lower corruption effect on output (we elaborate further on this in the next chapter of this thesis).

In an inadequately indexed economy, an increase in inflation results in a fall in the tax collection rate as there is more shadow sector work and/ or corruption. This negatively affects registered output. Thus if the tax collection rate is negatively related to the rate of inflation, commitment to low inflation may be superior to discretion even if the CB and FA have different preferences.

4.10 Conclusion

We modify the time inconsistency model by Alesina and Tabellini and apply it to post-communist Russia. The modifications involve allowing for weak tax collection abilities of the authorities. The results are analysed both algebraically and graphically. The results show that in the presence of a weak tax base the time consistent rate of inflation under both discretion and commitment is higher, output is higher and taxation revenues are lower.

We apply the model to Russia's experiences since the fall of communism and suggest that for the two non-consecutive periods under consideration when the authorities could not or did not borrow from the public, Russia moved from one sub-optimal position to another.

For the first period under consideration, 1992-94, Russia had an independent central bank which had different preferences to the fiscal authority and policy was non-coordinated. According to the model, policy should have been discretionary. In

fact, policy was discretionary with fairly disastrous consequences for inflation. We suggest that the reason for this was that the central bank attached a lower weight to inflation reduction than the fiscal authority, and this violated one of the underlying assumptions of the model. The authorities were collecting too much revenue in the form of inflation and too little in the form of taxation. This analysis sheds new light on the large output fall experienced by Russia during this period. It suggests that in the period 1992-94 in Russia when GDP growth fell by about minus 12 per cent, the fall in output would have been even greater if the central bank had been averse to inflation. That is, things were not as bad as they could have been.

For the second period under consideration, post August 17 1998, the central bank remained committed to a low inflation policy, the CB had different (more inflation-averse) preferences to the FA, and policy was uncoordinated. The model suggests that policy should in fact have been discretionary as authorities are collecting too little in the form of seigniorage and too much in the form of distortionary taxation. The analysis suggests that Russia's current policy of a committed central bank may mean that output is too low. It appears that the efforts of the Russian authorities to improve taxation revenues by increasing tax collection rates rather than tax rates may have delayed the impact of a committed central bank on output. This model suggests however, that once tax collection is as perfect as it could be, tax rates will have to be increased if the central bank remains committed to a low inflation policy and this will have a negative effect on output. The model suggests that the optimal policy would now in fact be discretionary policy.

We also briefly analyse the causes and consequences of a *varying* tax collection rate. We consider two main causes of a varying tax collection rate: taxation and inflation. In an economy where the tax base varies with the rate of taxation,

discretion may be even more preferable to commitment when the FA and CB have different preferences as it involves a lower rate of distortionary taxation than commitment. output. In an inadequately indexed economy, an increase in inflation results in a fall in the tax collection rate as there is more shadow sector work and/ or corruption. This negatively affects registered output. Thus if the tax collection rate is negatively related to the rate of inflation, commitment to low inflation may be superior to discretion *even if* the CB and FA have different preferences.

Chapter 5

Optimal Monetary Policy with Bureaucratic Corruption

5.1 Introduction

This chapter builds on the results of the previous chapters by focusing on the optimality of monetary policy in the presence of bureaucratic corruption. We focus on the consequences of corruption for inflation, output, and taxation in an economy with non-coordinated and coordinated monetary and fiscal policies and an independent central bank.

Our model is based the one by Alesina and Tabellini (1987) which suggests that where the monetary and fiscal authorities have the same objective function, binding commitments to policies can be welfare-improving, but where the authorities have different preferences then a discretionary regime *may* be better.

In this paper we show that in the presence of corruption the output loss associated with commitment *will* outweigh the benefits of lower inflation when the preferences of the central bank and fiscal authority are not coordinated. Even when preferences

are coordinated, it *may* be the case that the output loss associated with commitment may be too great when compared with the benefits of lower inflation. These results are contrary to those of existing models of time inconsistency which suggest that binding commitments are necessarily preferable to discretion, especially when preferences are coordinated (for example, Beetsma and Bovenberg, 1997).

This chapter builds on the results of two previous chapters of this thesis. In Chapter 3 in of this thesis, an increase in the tax rate results in a rise in the corruption tax as corrupt bureaucrats seek to supplement their decreasing official net bureaucratic wages. This results in a fall in legitimate private sector supply. In Chapter 4, we suggest that the time consistent level of inflation may be too low in a regime of commitments with non-coordinated preferences if the tax base is weak. In this chapter, one of the causes of a weak tax base, corruption, and its negative impact on aggregate supply, are taken into account whilst analysing the optimality of monetary policy.

We model corruption as a proportional tax on the total revenues of firms. The proceeds of the corruption tax, unlike those of the official tax, do not go into government coffers. We model the corruption tax as a positive function of the official tax rate. The higher the official tax, the higher the corruption tax levied by public bureaucrats in order to supplement their decreasing official net wage, and the lower is output.

We show three main results. Firstly, as the corruption tax has a negative impact on output and rises as the official tax rate rises, the output loss under commitment exceeds that under discretion because official tax rates are higher. Secondly, for both discretion and commitment, optimal output, taxation and government expenditure are lower, and inflation is higher. Thirdly, for both discretion and commitment the loss of

output and the rise in inflation is less when preferences are coordinated than when they are not coordinated.

We show that when preferences are not coordinated, discretion will be preferable to commitment as the gains from reduced inflation are far outweighed by the loss in output and government expenditure, and higher taxes. Both players, the fiscal authority and the central bank, are worse off under commitment. Thus the movement from discretion to commitment is not a pareto improvement as at least one player is worse off.

We go further and suggest that even when preferences are coordinated, discretion may be preferable to commitment as the gains from reduced inflation may be outweighed by the loss of output and government expenditure and higher taxes. At least one of the players, particularly the fiscal authority, may be worse off under commitment.

A possible solution to this problem involves allowing policy to remain discretionary, unless corruption is minimised through increasing bureaucratic wages in line with tax increases.

Our model is particularly applicable to the immediate aftermath of the August 17, 1998 situation in Russia when corruption was rife, the preferences of the fiscal authority and central bank were non-coordinated, monetary policy was committed, and public debt was unavailable. In the post August 17 1998 period, the government could not borrow from the public because it had announced a *de facto* default on its debts. Indeed, post-August 17 1998, while the Central Bank of Russia continued to keep a tight rein on monetary policy and did not resort to widespread printing of money, there was some rise in inflation, a fall in output (real GDP slowed in the

fourth quarter of 1998), and a fall in actual public spending. A rise in tax rates was averted by simply raising the tax collection rate as Russia's tax base is unusually weak.

Our model has a number of interesting implications. One of the implications is that inflation-reduction in a corrupt economy has more severe consequences for output, inflation and government expenditure than in a non-corrupt economy. This model may help explain why tighter monetary policies in many transition and developing countries, particularly Russia, result in larger-than-expected output losses, higher-than-anticipated inflation, larger government budget deficits as planned expenditures exceed actual revenues, and lower tax rates. This has implications for a large number of governments of developing and post-communist transition economies who are facing the choice between rules and commitment in the presence of corruption.

Resolving the problem of corruption in Russia is imperative, and in the absence of complete eradication, higher bureaucratic net wages which rise in line with tax increases. While lending support to the IMF policy of independent professional central banks committed to a low inflation policy, the model suggests that this may not be optimal if corruption is rife and especially if the central bank and the fiscal authority do not have co-ordinated monetary and fiscal policies.

The rest of the chapter is organised as follows. The basic model is developed in section 5.2. Sections 5.3 and 5.4 discuss discretion and commitments respectively, with and without coordinated preferences. In section 5.5 we make comparisons between discretion and commitment and discuss the results in relation to Russia. Section 5.6 concludes.

5.2 The Model

In the model there are three players: the central bank (CB), fiscal authority (FA) and the wage setters. Wage setters move first, setting wages one period in advance based on expectations of the price level. In the next period, the CB and FA simultaneously set money growth and taxes: price levels in excess of the previous period's expectations can result in real output movements.

One of the basic assumptions of the literature on time inconsistency is that the market-determined level of employment is too low, either because of labour market imperfections or because of tax distortions. The authorities would like to increase employment by increasing output but because of the standard specification of aggregate supply it can only do so by generating surprises.

The centralised trade union (TU) wishes to minimise the deviations of the real wage from a target v. Its loss function is:

$$V^{TU} = \frac{1}{2}\sum_{t=0}^{T}\rho^{t}\left(w_t - p_t - v\right)^2 \qquad 1 > \rho > 0 \qquad (1)$$

where: p = log of price level

w = log of nominal wage

The first order condition is given by:

$$w_t = p_t^e + v \qquad (2)$$

At their desired wage, union members are willing to supply any amount of labour.

The supply function is given by:

$$x_t = \alpha\left(\pi_t - \pi_t^e - \tau_t - v - \tau_{BRt}\right) \qquad \alpha > 0$$

where: x = log of real output

π = actual inflation rate

π^e = expected inflation rate

τ_t = tax rate on the total revenue of firms, $0 \leq \tau_t \leq 1$

τ_{BRt} = unofficial corruption tax on the total revenue of firms, $0 < \tau_{BRt} \leq 1$

The supply curve shows that output depends positively on inflation surprises $(\pi_t - \pi_t^e)$ and depends negatively on distortionary taxes (τ_t), corruption taxes (τ_{BRt}), and the target wage (v). Previous studies of time inconsistency have set $\tau_{BRt} = 0$; that is that there is no corruption in the economy. The corruption tax, which is always positive, is levied unofficially on the legitimate private sector by corrupt bureaucrats seeking to supplement their real net bureaucratic wages. For simplicity real net bureaucratic wages fall only as the tax rate rises, and not as the rate of inflation rises (earnings are adequately indexed) or government expenditure falls (as in chapter 3). We assume therefore that the corruption tax is a linear function of the tax rate:

$$\tau_{BRt} = f(\tau_t); \qquad \frac{\partial \tau_{BR}}{\partial \tau} > 0, \quad \frac{\partial^2 \tau_{BR}}{\partial \tau^2} = 0$$

There is no public debt, and government spending is financed either by distortionary taxes (fiscal authority) or by money creation (central bank). The absence of debt in our model, whilst restrictive, enables us to concentrate on the essential issues. We believe the fundamental results of this paper will not be affected by the introduction of a debt variable.The government budget constraint is given by:

$$g_t = \tau_t + \frac{(M_t - M_{t-1})}{P_t Y_t}$$

$$g_t = \tau_t + \pi_t \qquad (3)$$

g denotes the ratio of public expenditures over output and is set residually after inflation and taxation are set.

The two authorities may or may not have the same preferences and may or may not act in a co-ordinated way. Policymakers wish to minimise the deviations of inflation and output from targets normalised on zero, and to minimise the deviations of public spending (g) from some positive amount, $\bar{g}$. The loss function of the central bank is given by:

$$V^{CB} = \frac{1}{2}\sum_{t=0}^{T} \beta^t \left[\pi_t^2 + \mu_1 x_t^2 + \mu_2 \left(g_t - \bar{g}\right)^2\right] \tag{4}$$

$$\mu_1 > 0, \quad \mu_2 \geq 0, \quad 0 < \beta < 1, \quad \bar{g} > 0$$

The loss function of the fiscal authority is given by:

$$V^{FA} = \frac{1}{2}\sum_{t=0}^{T} \theta^t \left[\pi_t^2 + \delta_1 x_t^2 + \delta_2 \left(g_t - \bar{g}\right)^2\right] \tag{5}$$

$$\delta_1 > 0, \quad \delta_2 \geq 0, \quad 0 < \vartheta < 1,$$

If $\bar{g}$ is positive, policymakers wish, in every period, to raise an amount $\bar{g}$ of revenues in the form of either taxes or seigniorage. If v is positive, trade unions force output to be lower than the level desired by policymakers. Thus, if either $\bar{g}$ or v is positive then the FA and CB have incentives to create unexpected inflation in order to increase the level of output towards their desired level and to partially finance public expenditure.

Assume that

$\delta_i \geq \mu_i$ for $i=1,2$

Thus the central bank will attach a greater weight to inflation relative to output and public spending. Although the CB and FA are assumed to have the same ultimate goals, they disagree on the optimal mix of financing.

5.3 Discretion

In the discretionary regime no commitments are made to policies. The authorities are free to set or to change policies if and when they want. The game between the authorities is static and finite, hence the subgame perfect Nash equilibrium is the unique Nash equilibrium of the one-shot game. The unique Nash equilibrium of the one-shot game can be derived from the first order conditions of the FA and CB. This Nash equilibrium is time consistent because none of the players have the incentive to deviate from the equilibrium: the central bank has no incentive to generate policy surprises because the fiscal authority's choice of taxes and the trade union's choice of wages are in line with the central bank's preferences.

First we will derive the equilibrium levels of output, inflation and public spending from target levels. The Nash equilibrium is time consistent for a given tax collection rate. The authorities are assumed to have different objective functions and policies are non-coordinated. We will then extend the results by deriving a long run supply curve and the reaction functions of the fiscal authority and central bank to generate my graphical framework. We will compare the results with those with no bribery and corruption.

5.3.1 Non-Coordinated Preferences

FISCAL AUTHORITY

V^{FA} in one period: $$\frac{1}{2}\left[\pi_t^2 + \delta_1 x_t^2 + \delta_2 (g_t - \bar{g})^2\right] \qquad (6)$$

Minimising V^{FA} subject to the supply curve and the government's budget constraint,

i.e.

$$\frac{\partial V^{FA}}{\partial \tau} \quad \text{subject to} \quad x_t = \alpha(\pi_t - \pi_t^e - \tau_t - v - \tau_{BRt}) \qquad (7)$$

and $$g_t = \tau_t + \pi_t \tag{8}$$

Therefore, V^{FA} in one period:

$$\frac{1}{2}\left[\pi_t^2 + \delta_1\alpha^2\left(\pi_t - \pi_t^e - \tau_t - v - \tau_{BRt}\right)^2 + \delta_2(\tau_t + \pi_t - \bar{g})^2\right]$$

$$\frac{\partial V^{FA}}{\partial \tau} \Big/ \pi, v = \frac{1}{2}\left[-2\delta_1\alpha^2\left(\pi_t - \pi_t^e - \tau_t - v - \tau_{BRt}\right) + 2\delta_2(\tau_t + \pi_t - \bar{g})\right]$$

$$= -\delta_1\alpha x_t + \delta_2\left(g - \bar{g}\right) = 0$$

$$x^{dBR} = -\frac{\eta\delta_2}{\alpha\delta_1}\left(\bar{g} - g^{dBR}\right) \tag{9}$$

From (9), $x^{dBR} < 0$. The equilibrium level of output is below its target, zero. The higher is $\bar{g}$, the greater the need for τ (given π, v) and the lower is x. g and x are directly associated because both rely on seigniorage.

Comparing with the case where there is no corruption, $x^{dBR} < x^{d}$. The equilibrium level of output is lower when bribery and corruption is present. This is because government expenditure is further away from its target, $\bar{g} - g^{dBR} > \bar{g} - g^{d}$ (see below).

CENTRAL BANK

V^{CB} in one period: $$\frac{1}{2}\left[\pi_t^2 + \mu_1 x_t^2 + \mu_2(g_t - \bar{g})^2\right]$$

$$\frac{\partial V^{CB}}{\partial \pi} \quad \text{subject to} \quad x_t = \alpha\left(\pi_t - \pi_t^e - \tau_t - v - \tau_{BRt}\right) \text{ and } g_t = \tau_t + \pi_t$$

Therefore, V^{CB} in one period:

$$\frac{1}{2}\left[\pi_t^2 + \mu_1\alpha^2\left(\pi_t - \pi_t^e - \tau_t - v - \tau_{BRt}\right)^2 + \mu_2(\tau_t + \pi_t - \bar{g})^2\right]$$

$$\frac{\partial V^{CB}}{\partial \pi} \Big/ \tau, v = \frac{1}{2}\left[2\pi_t + 2\mu_1\alpha^2\left(\pi_t - \pi_t^e - \tau_t - v - \tau_{BRt}\right) + 2\mu_2(\tau_t + \pi_t - \bar{g})\right]$$

$$= \pi_t + \mu_1\alpha x_t + \mu_2\left(g - \bar{g}\right) = 0$$

Using (9), $$\pi^{dBR} = \frac{\mu_1\delta_2 + \mu_2\delta_1}{\delta_1}\left(\bar{g} - g^{BRdw}\right) \qquad (10)$$

From (10), $\pi^{dBR} > 0$. The equilibrium rate of inflation is positive (above its zero target level) and positively related to $\bar{g}$. The higher is $\bar{g}$ the higher is inflation (seigniorage) to finance public spending.

Comparing with the case with no corruption $\pi^{dBR} > \pi^d$. The equilibrium rate of inflation is higher in the presence of bribery and corruption.

GOVERNMENT EXPENDITURE

From (9), $$-\delta_1\alpha x_t + \delta_2\left(g - \bar{g}\right) = 0$$

Hence $$\left(\bar{g} - g\right) = -\frac{\alpha\delta_1}{\delta_2}x_t$$

An expression for x_t will be generated in terms of $\pi, \bar{g}$, and v and then substituted back into the expression for $\left(\bar{g} - g\right)$.

From (7) $$x_t = \alpha\left(-\tau - v - \tau_{BR}\right) \qquad \text{given } \pi = \pi^e$$

Using (8), $$x_t = \alpha\left(\pi - g - v - \tau_{BR}\right)$$

However, from (9), $$g_t = \frac{\delta_1\alpha x_t}{\delta_2} + \bar{g}$$

$$x_t = \alpha\left(\pi_t - \frac{\delta_1\alpha x_t}{\delta_2} - \bar{g} - v - \tau_{BR}\right)$$

$$x_t\left(\frac{\delta_2+\delta_1\alpha^2}{\alpha\delta_2}\right)=\pi_t-\left(\bar{g}+v+\tau_{BR}\right)$$

$$x_t=\frac{\alpha\delta_2}{\delta_2+\delta_1\alpha^2}\left(\pi_t-\left(\bar{g}+v+\tau_{BR}\right)\right)$$

Substituting x_t calculated above into the expression for $\bar{g}-g$.

$$\left(\bar{g}-g\right)=-\frac{\alpha\delta_1}{\delta_2}\left[\frac{\alpha\delta_2}{\delta_2+\delta_1\alpha^2}\left(\pi_t-\left(\bar{g}+v+\tau_{BR}\right)\right)\right]$$

Using the equilibrium rate of inflation calculated in equation (10):

$$\left(\bar{g}-g^{dBR}\right)=-\frac{\alpha\delta_1}{\delta_2}\left[\frac{\alpha\delta_2}{\delta_2+\delta_1\alpha^2}\left(\frac{\mu_1\delta_2+\mu_2\delta_1}{\delta_1}\left(\bar{g}-g^d\right)-\left(\bar{g}+v\right)+\tau_{BR}\right)\right]$$

$$\left(\bar{g}-g^{dBR}\right)\left[1+\frac{\alpha^2}{\delta_2+\delta_1\alpha^2}\left(\mu_1\delta_2+\mu_2\delta_1\right)\right]=\frac{\alpha^2\delta_1}{\delta_2+\delta_1\alpha^2}\left(\bar{g}+v+\tau_{BR}\right)$$

$$\left(\bar{g}-g^{dBR}\right)\left[\frac{\delta_2+\delta_1\alpha^2+\alpha^2\mu_1\delta_2+\alpha^2\mu_2\delta_1}{\delta_2+\delta_1\alpha^2}\right]=\frac{\alpha^2\delta_1}{\delta_2+\delta_1\alpha^2}\left(\bar{g}+v+\tau_{BR}\right)$$

$$\left(\bar{g}-g^{dBR}\right)=\frac{\alpha^2\delta_1\left(\bar{g}+v+\tau_{BR}\right)}{\alpha^2\delta_1\left(1+\mu_2\right)+\delta_2\left(1+\alpha^2\mu_1\right)} \qquad (11)$$

The larger are $\bar{g}$ and v, the further away is g from its target. From (9) and (10), the higher is $\bar{g}$, the greater is output and the higher is inflation.

Government expenditure is less when bribery and corruption are present ($g^{dBR}<g^d$): the corruption tax variable in the numerator of equation (11) is positive when there is corruption and zero when there is not. This intuitively makes sense. Corruption negatively affects output which reduces taxation revenues, and hence the government has less to spend (for a given rate of inflation). Thus government

expenditure is further away from its target level, making it worse off (it aims to minimise deviations of output of g from $\bar{g}$).

Extending our results to allow graphical analysis involves deriving the long run supply curve and the reaction functions of the authorities in the inflation-output space and the inflation-tax space.

INFLATION-OUTPUT SPACE

Firstly the long run supply curve will be derived with output as a function of inflation. To generate the "no fooling" long run supply curve, assume $\pi = \pi^e$

From (7) $$x_t = \alpha(-\tau - v - \tau_{BR})$$

Using (8), $$x_t = \alpha(\pi - g - v - \tau_{BR})$$

However, from (9), $$g_t = \frac{\delta_1 \alpha x_t}{\delta_2} + \bar{g}$$

$$x_t = \alpha\left(\pi_t - \frac{\delta_1 \alpha x_t}{\delta_2} - \bar{g} - v - \tau_{BR}\right)$$

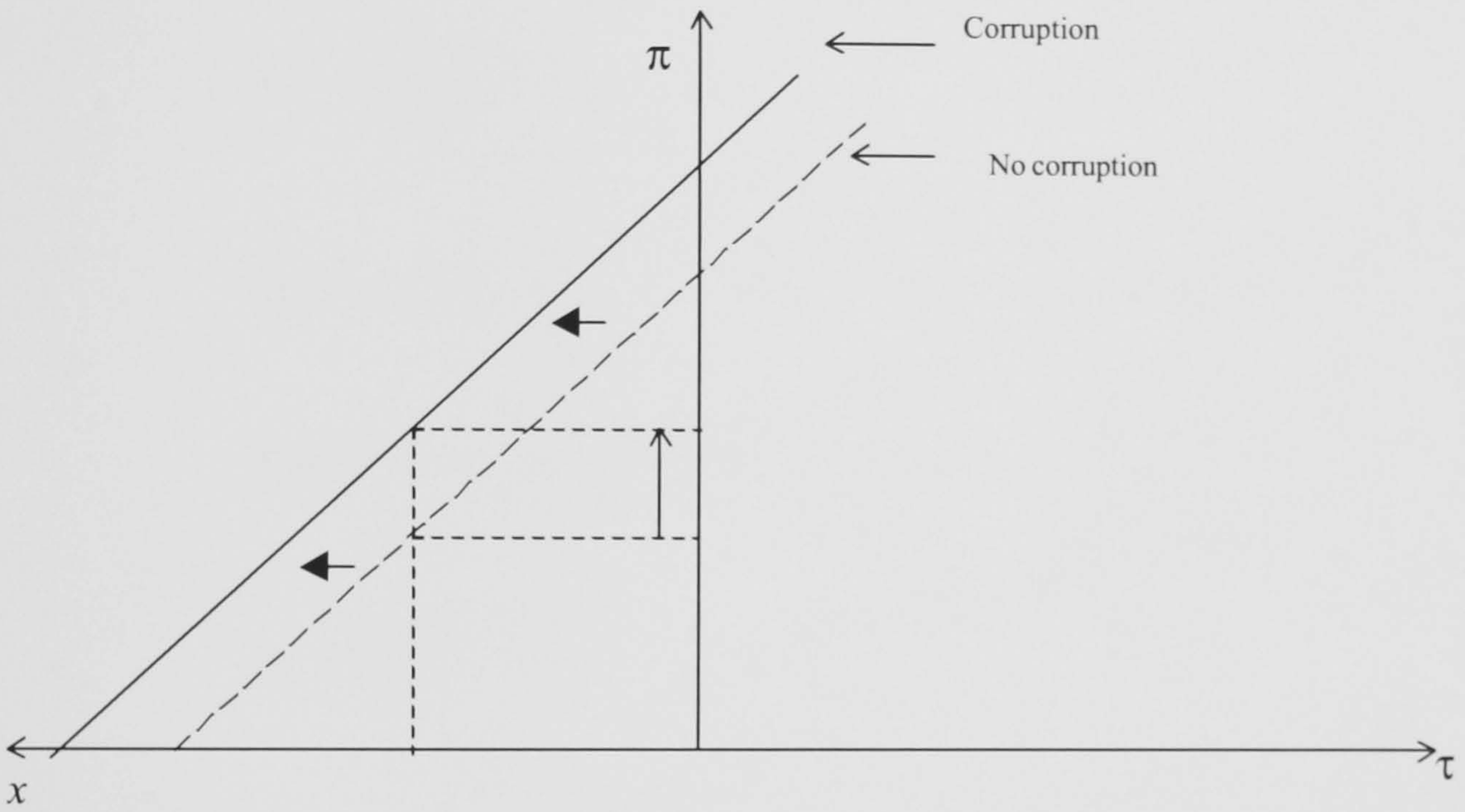
$$x_t\left(\frac{\delta_2 + \delta_1 \alpha^2}{\alpha \delta_2}\right) = \pi_t - (\bar{g} + v + \tau_{BR})$$

Long Run "No fooling" Supply Curve: $$x_t = \frac{\alpha\delta_2}{\delta_2 + \delta_1 \alpha^2}\left(\pi_t - (\bar{g} + v + \tau_{BR})\right) \quad (12)$$

The "no fooling" supply curve is positively related to inflation and is non-vertical: the more g is financed by seigniorage, the less distortionary is taxation and the higher is output. The intercepts of the supply curve with the inflation and output axes depend directly on the corruption tax, and consequently depend indirectly on the rate of tax set by the fiscal authority. Thus, contrary to previous results in which the long run supply curve does not shift as the tax rate varies, the supply curve in this

analysis will shift outwards as the tax rate increases. The intercept of the no fooling supply curve with the inflation axis is above that when there is no corruption and bribery, although the slopes are the same. Thus, a higher rate of inflation is needed to generate a given level of output. This is shown in the diagram below:

Figure 5.1: No fooling supply curve – comparing corruption and with no corruption



The *short run* central bank's reaction function will now be derived with inflation as a function of output. To generate the central bank's reaction function, (10) is used:

$$\pi_t = -\mu_1 \alpha x_t - \mu_2 \left(g - \bar{g}\right)$$

$$\pi_t = -\mu_1 \alpha x_t - \mu_2 \left(\frac{\delta_1 \alpha x_t}{\delta_2} + g - \bar{g} \right)$$

CB's reaction function: $$\pi_t = -\alpha \left(\mu_1 + \frac{\delta_1 \mu_2}{\delta_2} \right) x_t \qquad (13)$$

The reaction function is negatively sloping. The lower is output, the higher the incentive to generate surprise inflation. The slope of the central bank's reaction function in the inflation-output space is not affected by the presence of bribery/ corruption.

INFLATION-TAX SPACE

The fiscal authority's reaction function and the central bank's reaction function are derived below. In both cases inflation is a function of taxation. To generate the FA's reaction function, (9) is used:

$$x_t = -\frac{\delta_2}{\alpha\delta_1}\left(\bar{g} - g\right)$$

$$\delta_1\alpha x_t = \delta_2\left(g - \bar{g}\right)$$

$$\delta_1\alpha^2\left(-\tau - v - \tau_{BR}\right) = \delta_2\left(\tau + \pi - \bar{g}\right) \qquad \text{given } \pi = \pi^e$$

$$\pi_t = \frac{\delta_1\alpha^2}{\delta_2}\left(-\tau - v - \tau_{BR}\right) - \tau + \bar{g}$$

FA's reaction function:
$$\pi_t = -\left(\frac{\delta_1\alpha^2}{\delta_2} + 1\right)\tau + \bar{g} - \frac{\delta_1\alpha^2}{\delta_2}\left(v + \tau_{BR}\right) \qquad (14)$$

Inflation is negatively related to taxation. The lower the central bank sets inflation, the higher the FA sets distortionary taxes to finance public spending and the lower is output. While the slope of the reaction function is not affected by bribery and corruption, the intercept of the curve with the inflation and taxation axes is affected. To generate the central bank's reaction function, (10) is used:

$$\pi_t = -\mu_1\alpha x_t - \mu_2\left(\tau + \pi_t - \bar{g}\right)$$

$$\pi_t\left(1 + \mu_2\right) = -\mu_1\alpha^2\left(-\tau - v - \tau_{BR}\right) - \mu_2\left(\tau - \bar{g}\right)$$

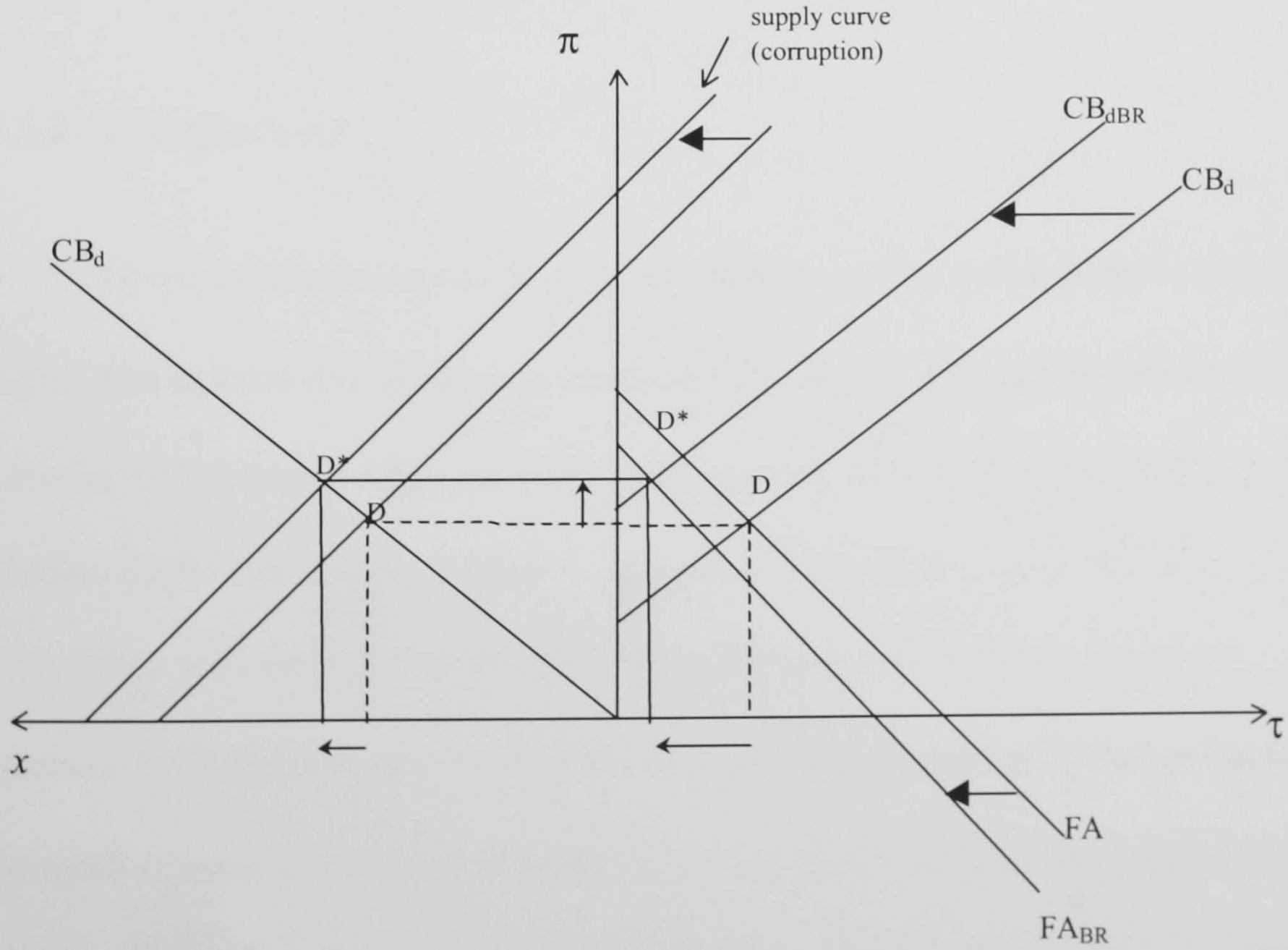
$$\pi_t(1+\mu_2) = -\tau(\mu_2 - \mu_1\alpha^2) + \mu_1\alpha^2 v + \mu_1\alpha^2\tau_{BR} + \mu_2\bar{g}$$

CB's reaction function:

$$\pi_t = \frac{1}{1+\mu_2}\left[(\mu_1\alpha^2 - \mu_2)\tau + \mu_1\alpha^2 v + \mu_1\alpha^2\tau_{BR} + \mu_2\bar{g}\right] \qquad (15)$$

Inflation is positively related to taxation. The higher are the distortionary taxes set by the FA, the lower is output, and the higher the CB's incentive to generate unexpected inflation to raise output (from (7), output is negatively related to taxes). The intercepts of the reaction function with the inflation and output axes are affected by the corruption tax, although the slope is not.

Figure 5.2: Equilibrium under discretion with noncoordinated preferences – comparing corruption with no corruption



Compared to the situation when there is no corruption, equilibrium output and taxation are lower and equilibrium inflation is higher.

5.3.2 Coordinated Preferences

Three of the equations calculated above are altered when $\mu_i = \delta_i$. These are the equilibrium level of inflation, π^{dBR}, the deviation of public spending from its target, $g - g^{dBR}$, the central bank's reaction function in the inflation-output space.

$$\pi^{dBR} = 2\delta_2\left(\overline{g} - g^{dBR}\right) \tag{10*}$$

$$\overline{g} - g^{dBR} = \frac{\alpha^2\delta_1\left(\overline{g} + v + \tau_{BR}\right)}{\alpha^2\delta_1\left(1 + 2\delta_2\right) + \delta_2} \tag{11*}$$

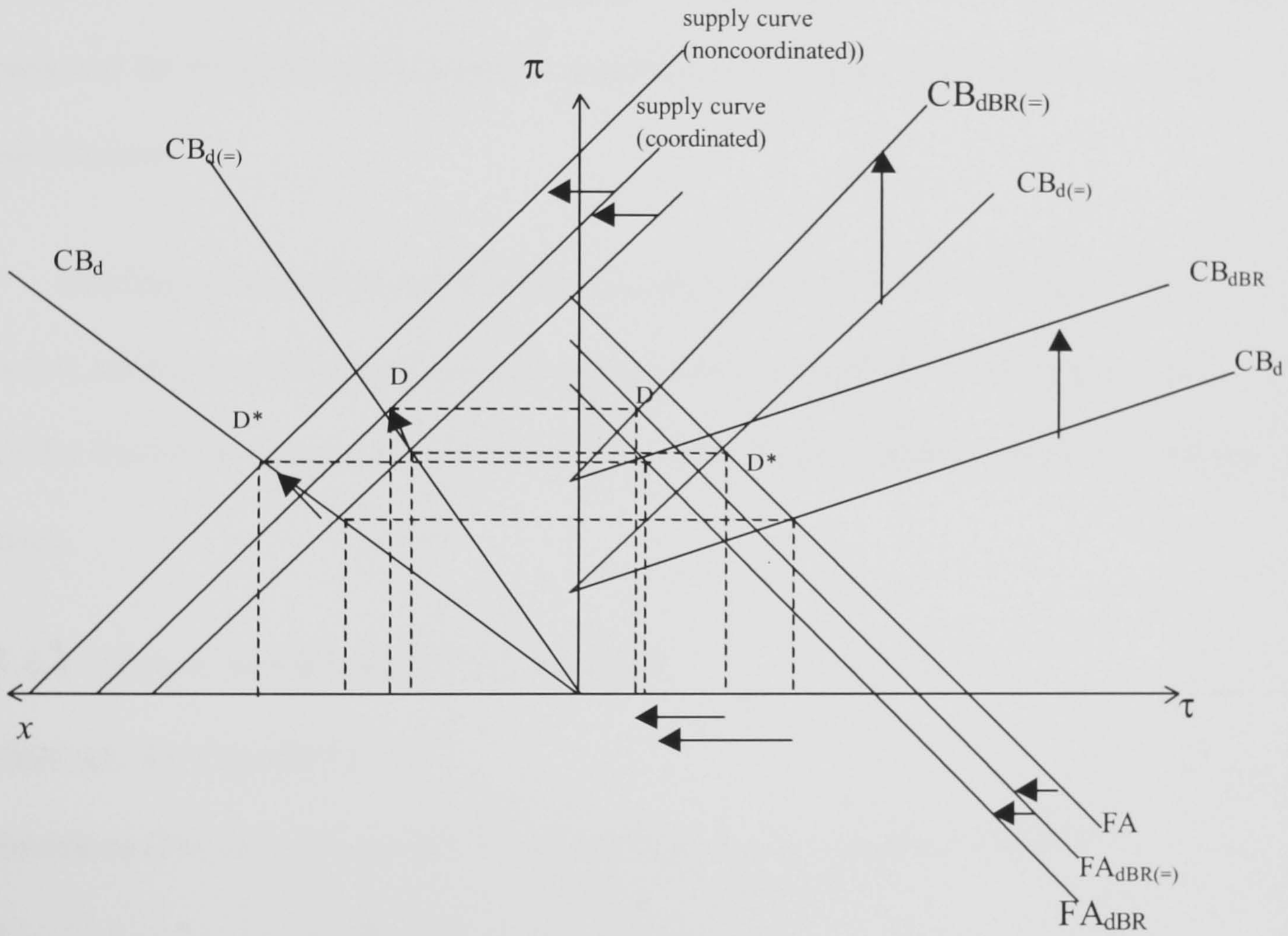
$$\pi_t = -2\alpha\delta_1 x_t \tag{12*}$$

5.3.3 Comparison

Given the condition that $\delta_i \geq \mu_i$, equilibrium inflation in equation (10*) is higher than equilibrium inflation in equation (10). That is, the equilibrium level of inflation π^{dBR} is higher when the authorities have the same objective function.). In addition public expenditure is higher. Alesina and Tabellini suggest that in comparison with the situation in which the authorities have different objective functions "in a discretionary equilibrium with $\mu_i = \delta_i$, the authorities are collecting too much revenue in the form of inflation and too little revenue in the form of taxes" (p.625). There is an increased incentive to inflate which is represented by a steeper central bank reaction function in the inflation-output space. This is one of the reasons why the IMF prefers an *independent* central bank: the incentive to inflate is lower.

The higher rate of tax under noncoordinated preferences means that the corruption tax is also higher. This affects the positions of the aggregate supply curves, the central bank reaction functions and the fiscal authority reaction functions whose intercepts depend on the rate of corruption tax. This is shown diagrammatically below.

Figure 5.3: Equilibrium under discretion - comparing coordinated with noncoordinated preferences



There is a greater reduction in output and taxation in the presence of corruption when preferences are not coordinated compared to when preferences are coordinated. There is a greater rise in inflation when preferences are not coordinated compared to when they are coordinated. Thus in the presence of corruption, both players are worse off if they have noncoordinated preferences.

5.4 Commitment

The central bank enters into **a binding commitment** about its policy before the trade union sets wages. The central bank sets a rate of inflation and then the trade union sets wages in line with the inflation rate set by the bank. In this way there are no inflation surprises, and because the central bank does not renege on its promises, a time inconsistent policy of low inflation may be sustained. In other words, the central bank and the trade union cooperate to achieve a low inflation and time inconsistent equilibrium.

Binding commitments are modelled by imposing the condition that $\pi = \pi^e$ before taking the first order condition of the objective function of the central bank. Under discretion this condition was imposed *after* the first order conditions had been taken.

5.4.1 Non-Coordinated Preferences

FISCAL AUTHORITY

Equations (16) and (17) are derived in a similar way to equations (9) and (10).

$$x^{cBR} = -\frac{\delta_2}{\alpha\delta_1}\left(\bar{g} - g^{cBR}\right) \qquad (16)$$

From (16), $x^{cBR} < 0$. The equilibrium level of output is lower when bribery and corruption are present. That is, $x^{cBR} < x^{c}$

CENTRAL BANK

V^{CB} in one period: $\frac{1}{2}\left[\pi_t^2 + \mu_1\alpha^2\left(-\tau_t - v - \tau_{BR}\right)^2 + \mu_2(\tau_t + \pi_t - \bar{g})^2\right]$

Imposing $\pi = \pi^e$ before taking the first order conditions rather than after, implies minimising:

$$\frac{\partial V^{CB}}{\partial \pi} \quad \text{subject to} \qquad x_t = \alpha(-\tau_t - v - \tau_{BR}) \quad \text{and} \quad g_t = \tau_t + \pi_t$$

Therefore, V^{CB} in one period: $$\frac{1}{2}\left[\pi_t^2 + \mu_1\alpha^2(-\tau_t - v - \tau_{BR})^2 + \mu_2(\tau_t + \pi_t - \bar{g})^2\right]$$

$$\frac{\partial V^{CB}}{\partial \pi} \Big/_{\tau,v} = \frac{1}{2}\left[2\pi_t + 2\mu_2(\tau_t + \pi_t - \bar{g})\right] = 0$$

$$\pi^{cBR} = \mu_2\left(\bar{g} - g^{cBR}\right) \tag{17}$$

From (17), $\pi^{cBR} > 0$. The equilibrium level of inflation is higher in the presence of corruption, $\pi^{cBR} > \pi^c$.

GOVERNMENT EXPENDITURE

The derivation is identical to that for discretion (equation (11)).

$$\bar{g} - g^{cBR} = \frac{\alpha^2\delta_1\left(\bar{g} + v + \tau_{BR}\right)}{\alpha^2\delta_1(1+\mu_2)+\delta_2} \tag{18}$$

Government expenditure is further away from its target when there is corruption. That is, $\bar{g} - g^{cBR} > \bar{g} - g^c$.

The long run supply curve and the reaction functions of the central bank and fiscal authorities will now be derived in the inflation-output and the inflation-tax space.

INFLATION-OUTPUT SPACE

The formula for the long run supply curve is identical to that under discretion and generated by an identical method. That is,

"No fooling" Supply Curve: $x_t = \frac{\alpha\delta_2}{\delta_2 + \delta_1\alpha^2}\left(\pi_t - \bar{g} - v - \tau_{BR}\right)$

Although the formula for the long run supply curve is identical to that under discretion, the actual position of the curve is not, as the position depends on the rate of corruption tax (and henceforth the rate of tax). Under commitment to low inflation, the rate of tax is higher than under discretion and therefore the supply curve will be further to the left of the supply curve under discretion.

The central banks reaction function is given by:

CB's reaction function: $\pi_t = -\mu_2\left(\frac{\delta_1\alpha}{\delta_2}\right)x_t$ (19)

The central bank is committed to lower inflation. This means that for a given amount of government spending, taxation is more distortionary and output is lower than in the discretionary case. The slope and position of the curve is unchanged in the presence of a corruption tax.

INFLATION-TAX SPACE

This is derived using a similar method to that for discretion

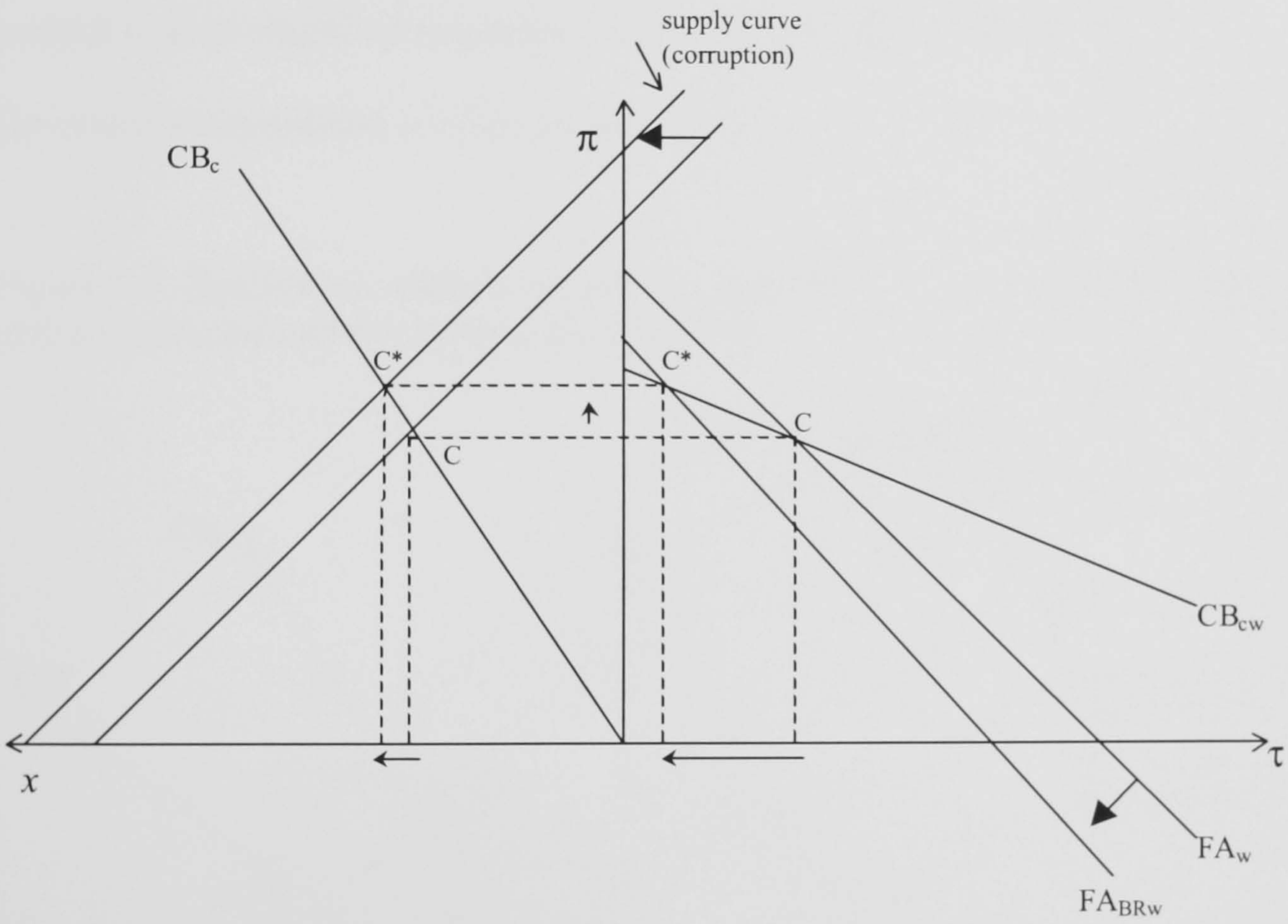
FA's reaction function: $\pi_t = -\left(\frac{\alpha^2\delta_1}{\delta_2} + 1\right)\tau - \frac{\alpha^2\delta_1}{\delta_2}v - \frac{\alpha^2\delta_1}{\delta_2}\tau_{BR} + \bar{g}$ (20)

The formula for the FA's reaction function is the same under commitment and discretion, although the position differs depending on the corruption tax rate.

CB's reaction function: $$\pi_t = \frac{\mu_2}{1+\mu_2}\left(\overline{g} - \tau\right) \qquad (21)$$

The rate of inflation is negatively related to the rate of distortionary taxation. Unlike the central bank reaction function in the inflation-tax space for discretion (equation (15)), the position of this curve is unchanged in the presence of corruption.

Figure 5.4: Equilibrium under commitment and noncoordinated preferences – comparing corruption and no corruption



Compared to the case when there is no corruption, equilibrium output and tax rates are lower and equilibrium inflation is higher.

5.4.2 Coordinated Preferences

Two of the equations calculated above are altered when $\mu_i = \delta_i$. These are the deviation of public spending from its target, $\overline{g} - g^{cBR}$ and the central bank's reaction function in the inflation-output space.

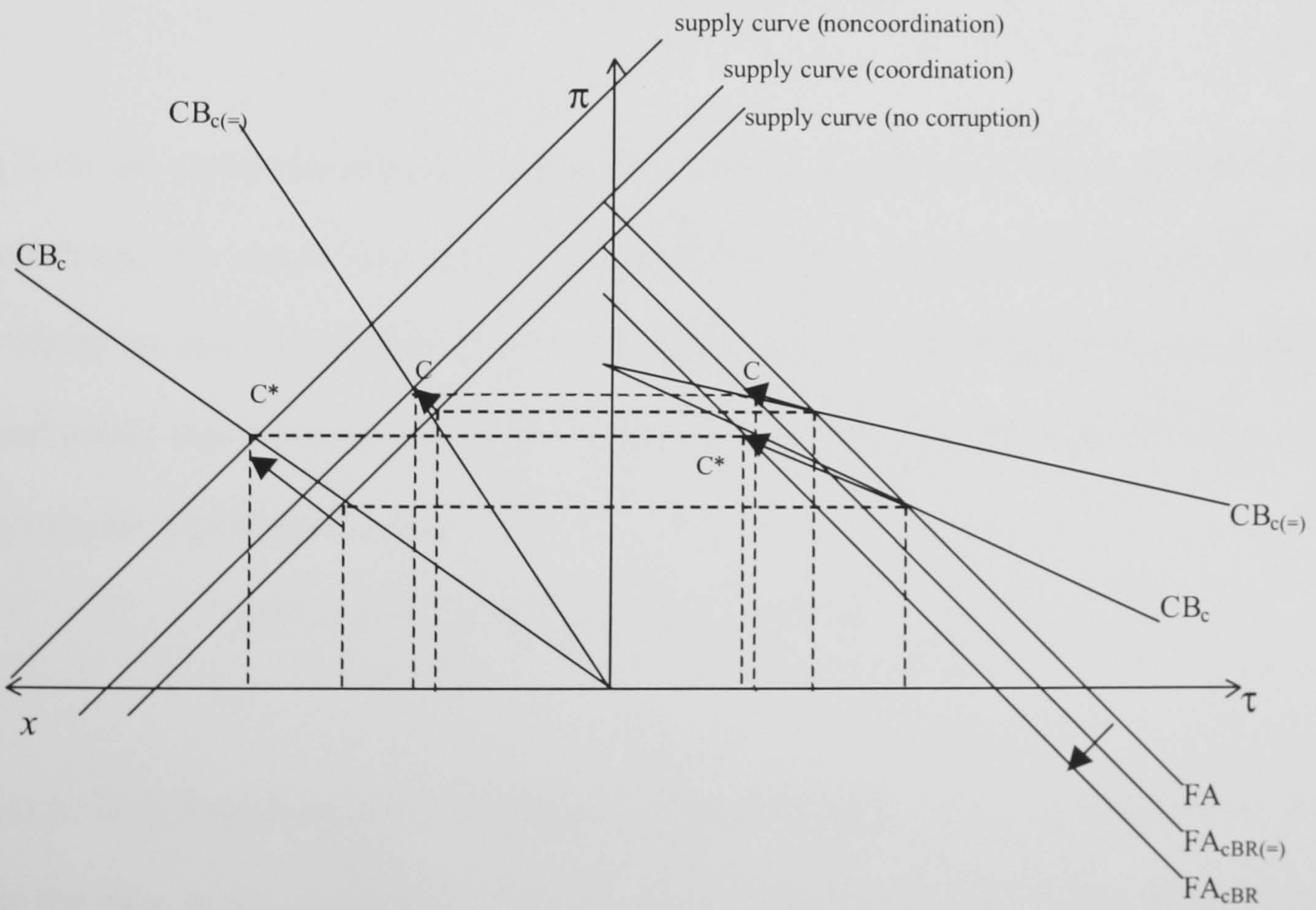
$$\bar{g} - g^{cBR} = \frac{\alpha^2 \delta_1 (\bar{g} + v)}{\alpha^2 \delta_1 (1 + \delta_2) + \delta_2} \qquad (18^*)$$

$$\pi_t = -\alpha \delta_1 x_t \qquad (19^*)$$

5.4.3 Comparison

The incentive to inflate is higher when the two authorities attach the same weights to their objectives (equation (18*) is steeper than equation (18)). Government expenditure is closer to its target level.

Figure 5.5: Equilibrium under commitment– comparing corruption and no corruption with coordinated and noncoordinated preferences



The loss of output and taxation is higher under corruption when preferences are not coordinated than when they are. The increase in inflation is higher when preferences are not coordinated.

5.5 Comparison and Discussion

Below is a summary of the results that have been derived.

(1) When policy is discretionary, in comparison to the case where there is no corruption, corruption results in higher inflation and lower output, lower taxation and lower government spending.

$$\pi^{dBR} > \pi^{d};\ x^{dBR} < x^{d};\ \tau^{dBR} < \tau^{dc};\ g^{dBR} < g^{d}$$

(2) When policy is committed, in comparison to the case where there is no corruption, corruption results in higher inflation and lower output, lower taxation and lower government spending.

$$\pi^{cBR} > \pi^{c};\ x^{cBR} < x^{c};\ \tau^{cBR} < \tau^{c};\ g^{cBR} < g^{c}$$

(3) As the corruption tax has a negative impact on output and rises as the official tax rate rises, the output loss under commitment exceeds that under discretion because official tax rates are higher. In general, discretion results in higher inflation, output, and public expenditures, and lower taxation than in a regime with commitments. The results are summarised below.

$$\pi^{dBR} > \pi^{cBR};\ x^{dBR} > x^{cBR};\ \tau^{dBR} < \tau^{cBR};\ g^{dBR} < g^{cBR}$$

(4) In both discretion and commitment, inflation is higher and taxation is lower than in the case of no corruption. If there were no corruption, the higher inflation and lower tax rate would have resulted in higher output. However in this case the CB and FA attempt to minimise the tax rate in return for higher inflation in order to minimise

the corruption tax. The higher rate of inflation and lower tax rate only manage to mitigate part of the loss in output associated with corruption.

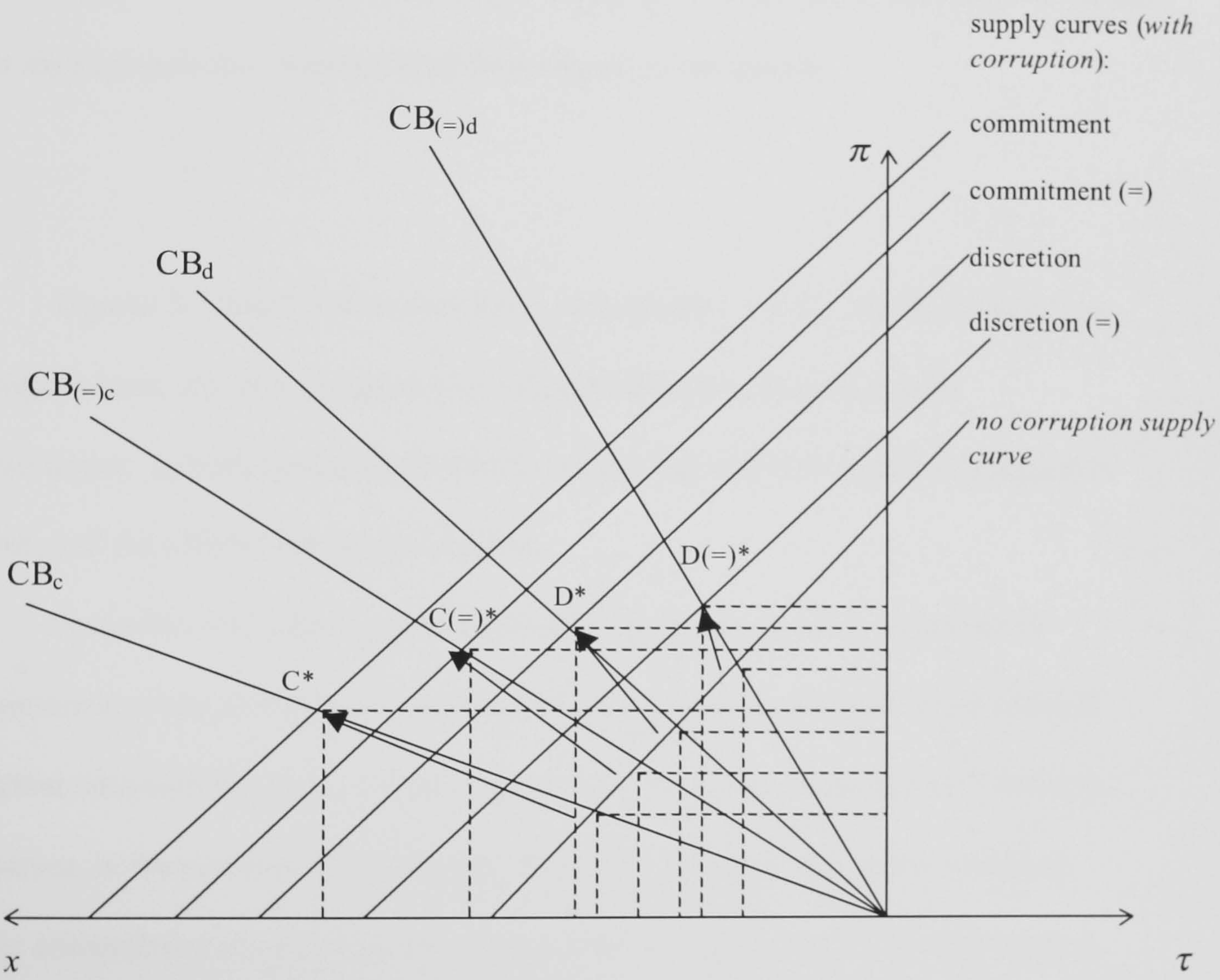
(5) In both discretion and commitment the loss in output and the rise in inflation is less when preferences are coordinated than when they are not coordinated.

If $\mu_i \neq \delta_i$, both the FA and CB will be worse off under commitment than under discretion. In moving from discretion to commitment we find that the loss in output and government expenditure is much higher in the presence of corruption, and the benefits from reduced inflation are lower. Overall, the gains from reduced inflation are more than outweighed by the losses in output and government expenditure and higher taxes. Thus the FA is made worse off, and the CB is also be worse as the output loss associated with higher taxes outweighs the gains from lower inflation.

If $\mu_i = \delta_i$, both the FA and CB may be worse off under commitment than under discretion. In the original (no corruption) paper by Alesina and Tabellini they suggest that when preferences are the same, binding commitments to monetary policy are necessarily welfare-improving, as the gains from reduced inflation more than outweigh the losses in output and government expenditure and higher taxes. This is despite the fact that the FA raises taxation in an attempt to compensate for part of the loss of public expenditure. In our paper, there is less reduction in inflation and a greater reduction in output and government expenditure. This is not compensated by a smaller increase in taxation, as there is an associated increase in the corruption tax. Thus the CB may be worse off if the gains from reduced inflation are outweighed by output reductions and government expenditure losses and higher taxes.

The diagram below shows the inflation-output combinations with and without corruption and with and without coordinated preferences. In all cases, there is a greater output loss in the presence of corruption than in the absence of corruption.

Figure 5.6: Equilibrium under discretion: comparing identical and non-identical preferences with and without corruption



(= implies coordinated preferences); arrows indicate distance between no corruption equilibria and corruption equilibria.

The supply curves for commitment are further out than those for discretion (with unchanged central bank reaction functions) as the corruption tax rate is higher. A commitments regime yields less of a reduction in inflation when corruption is present than when it is not, and more of an output reduction. Thus not only is the output loss greater under commitment, but there are reduced gains from inflation reduction. We suggest therefore that not only is discretion preferred when

preferences are noncoordinated, but discretion may also be preferred when preferences are coordinated depending on the rate of corruption in the economy.

The combined picture for discretion and commitments in the inflation-output and the inflation-tax space is shown in diagrams 6.7 and 6.8 below. For simplicity, we have not combined the non-coordination and coordination diagrams in one diagram as the joint diagram gets too cluttered if all four situations are shown.

Figures 5.7 and 5.8 show our three main results. Firstly, compared to the no corruption case, the loss in output under discretion is less than that under commitment. In both commitment and discretion the equilibrium rate of inflation is higher, and the official rate of tax is lower.

Secondly, under the no corruption case, discretion *may* be preferable to commitment when preferences are not coordinated because the gains from reduced inflation outweigh the losses in output and public spending (Alesina and Tabellini). However, in the presence of corruption, the losses in output and public spending under commitment are even greater compared to discretion and hence discretion *is* actually preferred to commitment.

Thirdly, even when preferences are coordinated, there is still a larger loss of output under commitment than discretion when corruption is present, and inflation is higher. We conclude that it may well be the case that discretion *may* also be preferable to commitment under these circumstances.

Figure 5.7: Equilibrium under commitment and discretion (non-coordinated preferences)

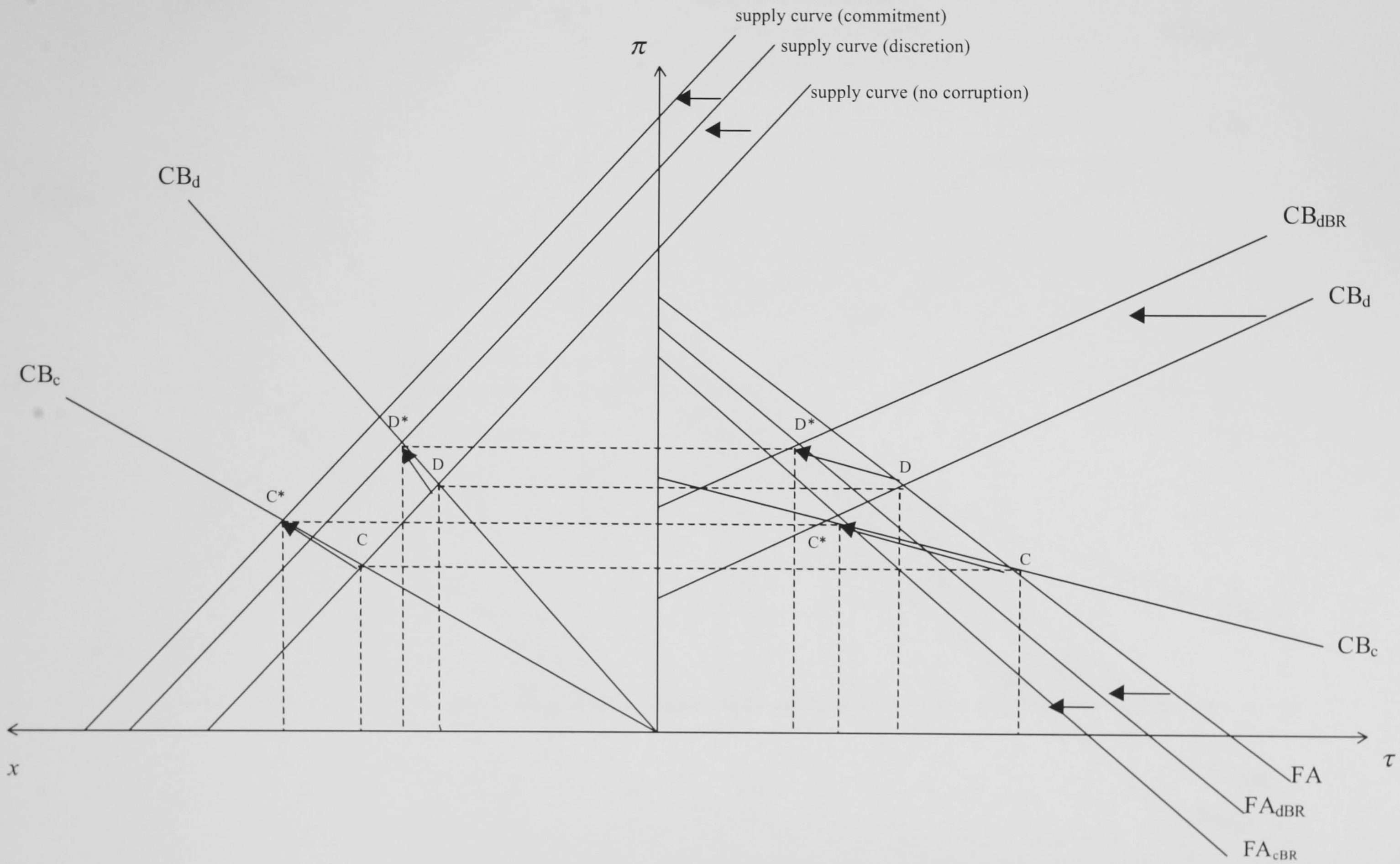
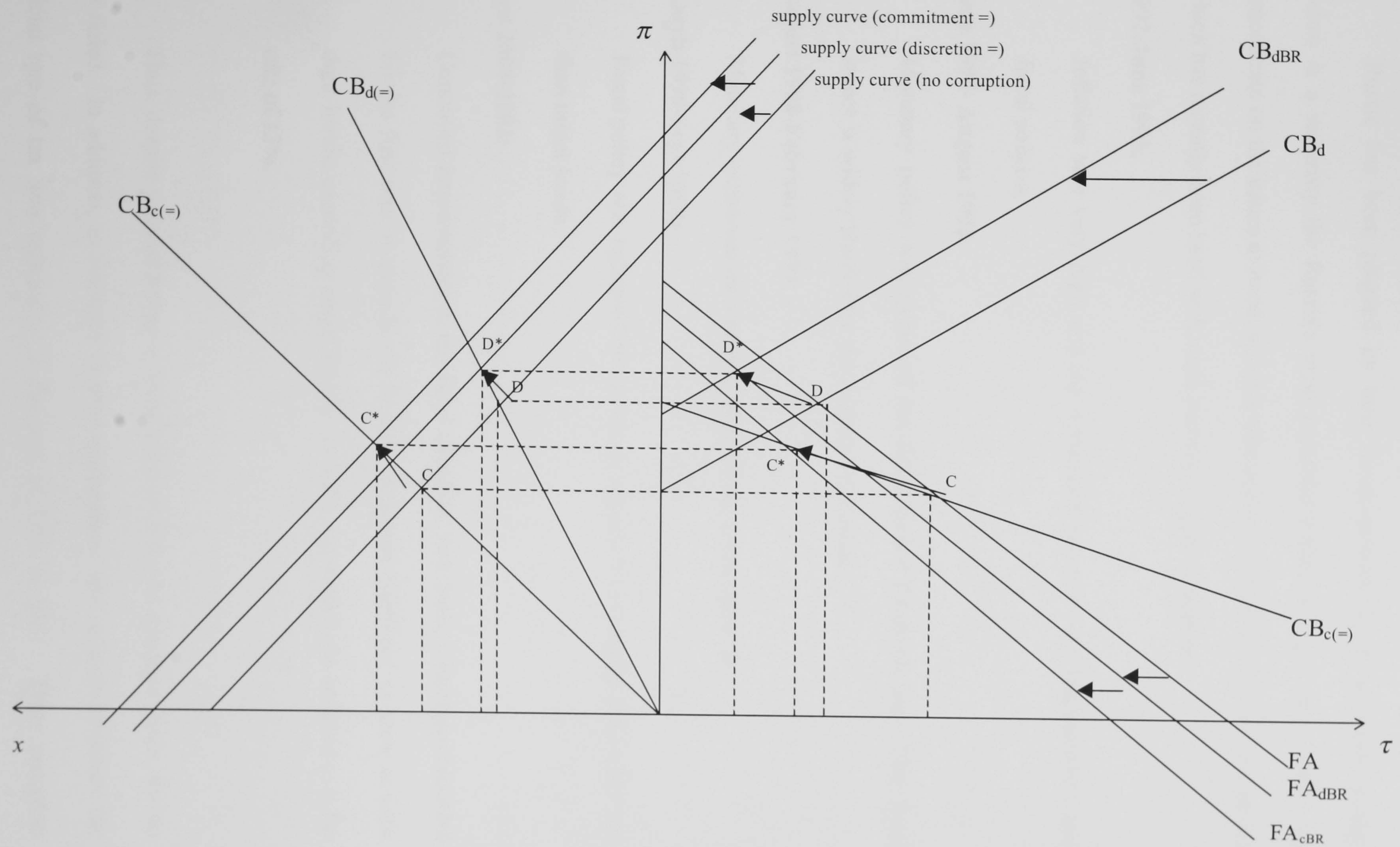


Figure 5.8: Equilibrium under commitment and discretion (coordinated preferences)



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5.6 Monetary Policy in Russia: 1992-2002

Russia has been plagued by time inconsistencies in its monetary policy. Below is a summary the Russia's main monetary policy attempts since 1992. To concentrate on the issues at hand, we omit discussion of Russia's exchange rate policy which has recently been used with some success to control inflation.

1992-June 1995:

Inflation was very high and the authorities pursued very lax monetary and fiscal policies.

June 1995- August 1998:

Monetary policy was tightened but fiscal policy remained lax. This fiscal stance is widely blamed for the August 1998 crisis.

August 1998-February 1999:

Monetary expansion increased to improve the fiscal situation.

March 1999-Sept 2000:

Fiscal policy was tightened but monetary aggregates expanded at a higher rate than target levels.

Sept 2000-2002:

Continued improvement in the fiscal situation, with budget surpluses recorded for the first time in post-Soviet history. Inflation continued to grow in two-digit levels, exceeding target levels. In 2001, tax rates were reduced to a flat rate of 13%.

Thus, despite years of trying to bring inflation down to one-digit levels, Russia has failed. In addition, to stimulate income declarations and increase revenues, the official rate of tax was reduced to a flat rate of 13% in 2001. These outcomes

correspond to one of less normative results of our model. That is, under both commitment and discretion the equilibrium rate of inflation is higher, and the official rate of tax is lower.

The rest of our theoretical results are normative and impossible to test empirically with respect to Russia. However further study can be undertaken to test the results in a wider cross-sectional time series setting than is permitted in this current work.

5.7 Conclusion

We introduce an unofficial corruption tax into a time inconsistency model of monetary policy. The corruption tax is positively related to the official rate of tax and has a negative impact on output. We show that the negative impact on output is greater under commitment than discretion because of a higher official tax rate. The equilibrium level of inflation is higher under both discretion and commitment.

In addition we show that when preferences are not coordinated, discretion *will* be preferable to commitment as the gains from reduced inflation are far outweighed by the loss in output and government expenditure, and higher taxes. Both players, the fiscal authority and the central bank, are worse off under commitment. Thus, the movement from discretion to commitment is not a pareto improvement as at least one player is worse off.

We go further and suggest that even when preferences are coordinated, discretion *may* still be preferable to commitment as the gains from reduced inflation may be outweighed by the loss of output and government expenditure and higher taxes. At least one of the players, particularly the fiscal authority, may be worse off under commitment.

The implications are that inflation-reduction in a corrupt economy has more severe consequences for output, inflation ánd government expenditure than in a non-corrupt economy. This model may help explain why tighter monetary policies in many transition and developing countries, particularly Russia, result in larger-than-expected output losses, higher-than-anticipated inflation, larger government budget deficits as planned expenditures exceed actual revenues, and lower tax rates.

We summarise Russia's monetary policies from 1992-2002 which seem plagued by inconsistencies. We suggest that one of the less normative results of our model, that corruption causes higher inflation and lower official taxation, appears to hold in the Russian context.

Chapter 6

Conclusion

6.1 Conclusions and Prospective Future Research

The primary objective of this thesis has been to contribute to the debate of the reasons behind Russia's poor economic performance in its first decade after the fall of communism by examining the role of IMF economic programs in the reform process. In particular, we are interested in the failure of neo-classical models of the market economy, upon which economic reform programs were based, to predict the outcomes in Russia.

We have offered a number of theoretical models which incorporate specific characteristics of the Russian economy, such as the political conflict within both the IMF and the Russian government regarding the reform programme, large-scale public sector corruption, a substantial underground economy, and a weak tax base. We analyse these models in relation to outcomes in Russia and find that the theoretical models are capable predicting the failings in the IMF-Russia economic reform program.

In chapter 2, we analyse the role of multilateral lending in Russia's reform. We suggest that during conditional development lending, especially in the case of Russia, the IMF has released further tranches of loans without the full implementation of the conditions attached to the loan. We suggest that this is the result of a feature of conditional development lending that may tempt the recipient to renege on its promises to comply with conditions, and which cannot be resolved by releasing the loans in tranches.

We suggest that the recipient is, in fact, aware that the donor is motivated not just by *economic* considerations but by its own *political* interests in the conditional development lending process, and that these political incentives are a factor in determining the donor's degree of *tolerance* of non- compliance with economic reform programmes. Thus there ensues a game in which the recipient, aware that the donor has political motivations, attempts to undertake the least level of compliance that guarantees it future loans, and the donor adopts a punishment strategy consistent with its political and economic motivations.

We model the static two-period game between the recipient and donor, in which the recipient chooses its level of compliance with policy conditions and the donor decides whether or not to extend further financing. We solve for the subgame perfect Nash equilibrium by backwards induction. This yields many lending-compliance equilibria depending on the values of the parameters in the payoff functions.

With so many lending-compliance options, and because it faces internal conflict in determining its lending options, we propose that a lender may attempt to create rules under which lending decisions are made to regulate the internal conflict. These rules are decided in an exogenous conflict between politics and economics that

takes place within the donor agency as to the circumstances under which punishment levied. This conflict, *in effect*, determines the donor's degree of tolerance for policy slippages. The rules which arise from the intra-donor conflict, while permitting some discretion over which transgressions to punish, help to regulate the internal conflict by providing a framework of action within which to work. The rules of thumb help fix the value of π in relation to δ.

We suggest three main types of rules that arise from the politics-economics split within the donor agency. The subgame perfect Nash equilibrium for each type of rule is solved by backward induction.

With Rule 1, *No re-lending,* no level of compliance is sufficient to ensure further financing. The equilibrium for this rule is *default, withhold.* That is, the lender will always choose to withhold further finance and the recipient will always choose to default.

With Rule 2, *Reward only full compliance,* the lender has no tolerance for policy slippages, and will punish any deviation from a full compliance strategy on the part of the recipient. A donor that acts like this may be adopting a particularly strict political stance with respect to this country, perhaps because it is not co-operating on key international political/ human rights agreements. If the donor has a "reward only full compliance" rule, then the recipient will choose to be fully compliant if the value of discounted future loans are of greater benefit to it than the immediate political benefits of non-compliance, and will choose to be non-compliant if not. If the recipient is fully compliant, the donor will offer further finance. If the recipient is non-compliant, the donor will withhold further finance.

With Rule 3, *Leniency*, the donor has tolerance for policy slippages depending on the circumstances of the recipient country. Unlike with Rules (1) and (2), there is

the possibility (γ) of receiving further finance for non-compliance. We find that if the donor punishes recipients who implement less than 100% of the conditions attached to the loan with a probability of γ, then the recipient will choose to fully comply with conditions as long as value of discounted future loans exceeds the immediate political gain from policy slippage. If the gain from policy slippage exceeds the cost associated with the loss of further finance, the recipient will be non-compliant. The recipient's choice of compliance level depends on the discount rate attached to the future loan, the political costs of compliance, and on the probability of punishment.

Our model differs from existing theories in explicitly allowing the lender and recipient to face a trade-off between political and economic interests within its organisation which affect the degree of slippage or the tolerance of policy slippages. Furthermore, the adoption of "rules of thumb" allow the donor to behave differently to two countries that implement the *same* proportion of required conditions, or to one country which implements the same proportion of required conditions over two different time periods.

We go further and discuss how the game between Russia and the IMF has elements of the game modelled in Section 2.3. In particular, we propose that from 1992-1998 the game between the two players had elements of Rule 3 (*Leniency*) where the probability of punishment was very low. From January 1999 - September 1999, the rules of the game seemed to change with the IMF adopting a hard line stance with regards to the last tranche of a loan. This "game" corresponded to elements of Rule 2 (*reward only full compliance*). Then from the end of September 1999 till December 31st 1999 (when President Yeltsin resigned), the game between the two players corresponded to Rule 1 (No Re-lending). Since the year 2000, we

propose that the game has once again reverted to the one that takes place under Rule 3, but with a higher probability of punishment.

In chapter 3, we analyse the contribution of fiscal policy to Russia's relatively poor economic performance since it began market reforms in 1992. We concentrate on the consequences for employment, output and taxation revenues of fiscal policy-induced changes in bureaucratic corruption in an economy with a large shadow economy. This allows us to discuss the consequences of some of the fiscal policies adopted by the Russian authorities during its transition to a market economy.

The first policy we consider is reduced public sector spending, in particular the running up of public sector wage arrears, because the spending targets of the Russian authorities often exceeded its revenue-raising abilities in 1992-1999. Since the year 2000, the Russian authorities have concentrated on paying back arrears and even increasing public sector wages which had been eroded by years of high inflation.

The second policy we consider is the policy of high taxes on wages. Russian authorities have recently imposed a 13% flat rate of income tax in an attempt to encourage people to disclose hidden earnings.

We build a three-sector model comprising a corrupt bureaucracy, shadow sector and legitimate private sector. We use a modified Cobb Douglas model in which there are two labour inputs: bureaucratic input and legitimate private sector input to separate out not only their respective contributions to output in the economy, but also to analyse variations in legitimate private sector employment separately from bureaucratic employment which is constant in the period in question in the model.

We model corruption as a proportional tax on the income of legitimate private sector workers. We define the *corruption effect* as the negative impact of an increase

in corruption on legitimate private sector employment and output. A crucial assumption is that bureaucrats are seeking to maintain a *constant* predetermined wage which is composed of their official and unofficial (corrupt) wage. This differs from the standard literature in which the rent-seeking behaviour of bureaucrats stems from their desire for a *higher* wage.

We suggest that some of the budgetary policies pursued by the Russian government, namely reduced spending and increased taxation resulted in an increase in the corruption tax and an associated decrease in employment, output and taxation revenues.

We also suggest that while in general the corruption effect of increased taxation and inflationary finance exceeds that of reduced spending, if reduced spending results in wage arrears to public bureaucrats then the corruption effect of reduced spending will exceed that of either increased taxation or inflationary finance.

We suggest a negative association between legitimate private sector employment and corruption. Further research to test the empirical basis of these associations could be undertaken.

This paper discusses the results of the chapter in light of Russia's experience. We find that despite the lack of enough empirical evidence to provide concrete correlations between the variables, some of the results appear to hold.

This paper also raises questions about the optimal official rate of tax in the presence of an unofficial tax on wages. The optimal rate of tax will depend on corruption and on the risk of detection for shadow sector activities. A reduction in the "crowding out" of private investment through reduced government expenditure may be offset by an increase in corruption.

This paper recommends widening the tax base as the least distortionary method of improving the budget deficit. Other policy recommendations are made, including wage indexation for bureaucrats and ensuring that the real net wage of bureaucrats is increased *before* structural adjustment programmes are implemented.

In chapter 4, we examine the optimality of Russia's monetary policy in the 1990s. Specifically we focus on the consequences for inflation, output, and taxation of non-coordinated monetary and fiscal policies in an economy with an independent central bank and a weak tax base. The model is applied specially to the Russian context.

Our model is a modified version of the model by Alesina and Tabellini (1987) which suggests that when policies are non-coordinated and the central bank is independent, then policymakers are better off in regime with discretion rather than commitments. When policies are coordinated, policymakers are better off under commitments.

We consider two non-consecutive periods in Russia when the central bank could not, or did not raise public debt to finance the budget deficit. For the first period under consideration, 1992-94, Russia had an independent central bank which had different preferences to the fiscal authority and policy was noncoordinated. According to the model, policy should have been discretionary. In fact, policy was discretionary with fairly disastrous consequences for inflation. We suggest that the reason for this was that the central bank attached a lower weight to inflation reduction than the fiscal authority, and this violated one of the underlying assumptions of the model. The authorities were collecting too much revenue in the form of inflation and too little in the form of taxation. This analysis sheds new light on the large output fall experienced by Russia during this period. It suggests that in the period 1992-94 in Russia when GDP growth fell by about minus 12 per cent, the fall in output would

have been even greater if the central bank had been averse to inflation. That is, things were not as bad as they could have been.

For the second period under consideration, post August 17 1998, the central bank remained committed to a low inflation policy, the CB had different (more inflation-averse) preferences to the FA, and policy was uncoordinated. The model suggests that policy should in fact have been discretionary as authorities are collecting too little in the form of seigniorage and too much in the form of distortionary taxation. The analysis suggests that Russia's current policy of a committed central bank may mean that output is too low. It appears that the efforts of the Russian authorities to improve taxation revenues by increasing tax collection rates rather than tax rates may have delayed the impact of a committed central bank on output. This model suggests however, that once tax collection is as perfect as it can be, tax rates will have to be increased if the central bank remains committed to a low inflation policy and this will have a negative effect on output. The model suggests that the optimal policy would now in fact be discretionary policy.

We suggest that improving tax *collection* rates increases taxation revenues without the distorting influence on the labour market and output. This is the strategy that has been adopted by the Russian authorities in recent years.

We also briefly analyse the causes and consequences of a *varying* tax collection rate. In an economy where the tax base varies with the rate of taxation, discretion may be even more preferable to commitment when the FA and CB have different preferences as it involves a lower rate of distortionary taxation than commitment.

In an inadequately indexed economy, an increase in inflation results in a fall in the tax collection rate as there is more shadow sector work and/ or corruption. This negatively affects registered output. Thus if the tax collection rate is negatively

related to the rate of inflation, commitment to low inflation may be superior to discretion *even if* the CB and FA have different preferences.

In chapter 5, we focus on the consequences of corruption for inflation, output, and taxation in an economy with non-coordinated and coordinated monetary and fiscal policies and an independent central bank.

Our model is based the one by Alesina and Tabellini (1987) which suggests that where the monetary and fiscal authorities have the same objective function, binding commitments to policies can be welfare-improving, but where the authorities have different preferences then a discretionary regime *may* be better. Their argument differs from the standard time inconsistency analysis prior to 1987 where binding commitments made by the central bank were seen as necessarily preferable to a discretionary regime.

In this paper we show that in the presence of corruption the output loss associated with commitment *will* outweigh the benefits of lower inflation when the preferences of the central bank and fiscal authority are not coordinated. Even when preferences are coordinated, it *may* be the case that the output loss associated with commitment may be too great when compared with the benefits of lower inflation. These results are contrary to those of existing models of time inconsistency which suggest that binding commitments are necessarily preferable to discretion, especially when preferences are coordinated (for example, Beetsma and Bovenberg, 1997).

We model corruption as a proportional tax on the total revenues of firms. The proceeds of the corruption tax, unlike those of the official tax, do not go into government coffers. We model the corruption tax as a positive function of the official tax rate. The higher the official tax, the higher the corruption tax levied by public

bureaucrats in order to supplement their decreasing official net wage, and the lower is output.

We show three main results. Firstly, as the corruption tax has a negative impact on output and rises as the official tax rate rises, the output loss under commitment exceeds that under discretion because official tax rates are higher. Secondly, for both discretion and commitment, optimal output, taxation and government expenditure are lower, and inflation is higher. Thirdly, for both discretion and commitment the loss of output and the rise in inflation is less when preferences are coordinated than when they are not coordinated.

We show that when preferences are not coordinated, discretion will be preferable to commitment as the gains from reduced inflation are far outweighed by the loss in output and government expenditure, and higher taxes. Both players, the fiscal authority and the central bank, are worse off under commitment. Thus the movement from discretion to commitment is not a pareto improvement as at least one player is worse off.

We go further and suggest that even when preferences are coordinated, discretion may be preferable to commitment as the gains from reduced inflation may be outweighed by the loss of output and government expenditure and higher taxes. At least one of the players, particularly the fiscal authority, may be worse off under commitment.

A possible solution to this problem involves allowing policy to remain discretionary, unless corruption is minimised through increasing bureaucratic wages in line with tax increases.

One of the implications of our model is that inflation-reduction in a corrupt economy has more severe consequences for output, inflation and government expenditure than in a non-corrupt economy. This model may help explain why tighter monetary policies in many transition and developing countries, particularly Russia, result in larger-than-expected output losses, higher-than-anticipated inflation, larger government budget deficits as planned expenditures exceed actual revenues, and lower tax rates. Indeed when we briefly examine Russia's attempts at lowering inflation over the first decade of transition, we note that inflation is still above one-digit targets and the official tax rate has had to be lowered to improve tax revenues.

Resolving the problem of corruption in Russia is imperative, and in the absence of complete eradication, higher bureaucratic net wages which rise in line with tax increases.

The models in this thesis have been built on the assumption that mistakes where make in the design and implementation of the reform programme, and that both Russia and the IMF had political motivations which sometimes conflicted with economic logic. One aspect of IMF reforms in Russia that we have not discussed in this paper is the consensus that neither Russia nor the IMF is to blame for the failure of reforms. After seventy years of central planning and huge market distortions it was not possible to reform the economy in the short- or medium-term.

Indeed, Russia has often been accused of not being "reformable" because of the legacy of central planning (for example, *The Economist*, 15 August 1992). Indeed, "Was the inheritance too crushing? Even by post-communist standards Russia came with an unusually difficult economic legacy. The reformers inherited a budget deficit running at 31% of GDP, foreign-exchange reserves down to three hours-worth of

import cover, and a collapse of trade with Soviet republics. The industrial base was huge and loss-making. Monopolies choked the economy. Nothing had been done to reform agriculture, a central failing of Mikhail Gorbachev's" (The Economist, 29 January 1994).

Additionally, Russia had little experience of private ownership and little exposure to the free market system. The IMF has admitted that the legacy of central planning has contributed to the failure of reforms in Russia. M. Camdessus, the former Managing Director of the IMF, suggests that the failure results from "70 years of central planning and the incomplete implementation of reform policies- itself a result of a lack of domestic political consensus on reform" (Camdessus, September 13, 1999).

Furthermore Russia had to build a democracy from scratch which is a major undertaking at any time. Schleifer and Treisman (1998) suggest that Russia's experience of reform results from it "undergoing democratic and economic reform simultaneously" (p.8). They suggest that an appropriate design of reform policies which takes institutions, interest groups, and the characteristics of the leader into account could have overcome the political opposition and institutional blockages that Russia experienced.

Prospective future theoretical and empirical work has been detailed where possible in each chapter. For instance, in chapter 2, we suggest that the theoretical model of conditionality would be richer if either repeated games or games with incomplete information were considered. More representative utility functions, such as nonlinear utility functions, would also improve the analysis. In chapter 3, future work would mainly be empirical as sufficient data for Russia becomes available to

test some of the interesting results and propositions of this chapter. In particular, establishing the empirical relationship between unemployment and corruption would be of some importance, especially for developing and transition economies. Chapters 4 and 5 do not lend themselves easily to empirical investigation. However, future work would try to establish whether higher inflation rates are in fact related to higher corruption levels.

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